MIDILLI HYDROELECTRIC POWER PLANT

Document Prepared By Ekobil Environmental Services and Consulting Ltd.

Contact Information: info@ekobil.com

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Prepared By	Ekobil Environmental Services and Consulting Ltd.
Contact	Ahlatlıbel Mahallesi, Güneykent Sitesi 1839. Sk. No 56, 06805 Ankara, Turkey. Tel:+90 312 489 1338 e-mail: info@ekobil.com www.ekobil.com

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1 PROJECT DETAILS

1.1 Summary Description of the Project

Masat Enerji Elektrik Üretim ve Tic. Ltd. Şti. is to construct a 32.55 MWe capacity Hydroelectric Power plant. Midilli Hydroelectric Power Plant (Midilli HPP in short) is a project that is designed and planned to be constructed on Yeşilırmak river , Amasya Turkey. Yeşilırmak River, is one of the biggest rivers in Turkey, and gives its name to the Yeşilırmak basin that makes up one of the 26 big river catchments of Turkey. The purpose of the project is to supply electricity to the Turkish power grid, from a renewable source.

The Project Activity (PA) utilizes the Yeşilırmak river water in a diversion-type run-of-river hydro power scheme to generate electricity with zero carbon emissions for the Turkish Power Grid. The PA will be displacing electricity that would otherwise be generated by the existing grid of the host country. Annual gross electricity production by the PA is estimated to be 124,050 MWh[1]. Therefore the Project Activity is expected to lead to an emission reduction of 63,761[2] tonnes CO_{2e} annually.

The environmental impacts of the project is kept to a minimum level and all the regulations that are in act in the host country, Turkey, are obeyed during the construction and operation stages of the Midilli HPP project. At the planning stage these impacts have been investigated and were presented to the Ministry of Environment and Urban Planning (MoEUP), in the form of a Project Introductory File (PIF). The provincial directorate of MoEUP in Amasya province examined the report, and the project was granted an EIA not Necessary certification. Considering that the project will be using the water resource that is also essential for the aquatic life in the area, there is a fish ladder (fish passage way) within the regulator for the downstream and upstream movement of the fish, to facilitate fish migration.

The, project owner Masat Enerji Elektrik Üretim ve Tic. Ltd. Şti., also owns an Hydro Power plant, namely the 22.5 MW capacity Yavuz HPP at the downstream of the project activity, and initially the two projects were developed together, however, it was not possible to benefit from carbon finance at the time of initial project development as the knowhow at the project owner side and the host country was limited at the time of early project development compared to the time when this PDD is being prepared. Initially for the two project the project owner signed a loan contract, but utilized the entire amount prior to the construction of Midilli HPP, for the Yavuz HPP Project and then they applied for another finance source as the project costs have increased significantly, and there were not many resource left for the Midilli HPP. Signing of the first loan is considered as the investment decision date for the Midilli HPP. Accordingly the Major milestones at the project development history can be summarized as shown in the following table (Table 1):

[1] The amount of electricity the project expected to produce is taken from the Revized Feasibility report dated September 2008
[2] Calculated by multiplying the annual electricity production with te Combined margin emission reduction factor (0.5140016 tCO_{2e}/MWh) calculated on the 3rd section of this document.

Table 1: Major project milestones

Date	Milestone	Reference
21/04/06	Water usage agreement signed with DSI	Water usage agreement
07/12/06	The Electricity Production License is granted activity	License number EÜ/365-2/478
29/05/07	Permits granted to set up construction work camp	NHS Records
15/08/07	Investment Decision Date	First Loan signature[3]
31/01/08	The EMRA decision for expropriation is issued	Expropriation decision letter
12/06/08	Turbine Contract Signed	Masat - ZOEC contract
01/09/2008	Revised FSR Issued	FSR dated September 2008
23/06/10	The New loan agreement is signed	Loan agreement
15/06/11	EIA Exemption certification issued	Certificate
09/12/12	Grid connection agreement signed	Agreement
27/12/12	Substantial Operation of Unit 2 & 4	Substantial Operation Protocol for Unit 2 and 4
24/12/13	Substantial Operation of Unit 1 & 3	Substantial Operation Protocol for Unit 1 and 3
18/03/14	DOE Contracted for Validation	Contract
15-17/06/2014	The project site is visited with the DOE	DOE Testimonial

How the project activity will be operating, and the boundary of the project activity (indicated in broken red line) is outlined in the following figures (Figure 1).

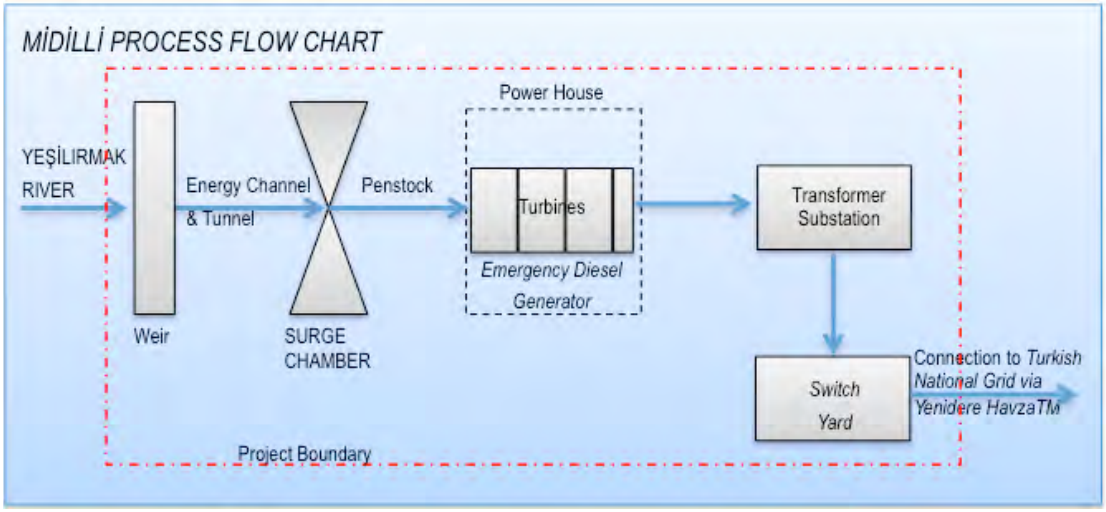


Figure 1: Flow chart showing the basic operational principles of the project activity, and the project boundary.

[3] Investment Decision Date

1.2 Sectoral Scope and Project Type

The project category is Sectoral Scope 1: Energy industries (renewable-/non -renewable sources). The project type is grid connected electricity generation from renewable sources. The project is a non-grouped, stand-alone project.

1.3 Project Proponent

Organization name	Masat Enerji Elektrik Üretim ve Tic. Ltd. Şti.
Contact person	Mr. Azmi Küçükkeleş
Title	General Manager
Address	Cumhuriyet Cad. 48/3-B Harbiye, 34367, Şişli - İstanbul Turkey
Telephone	+90 212 241 6820
Email	azmi.kucukkeles@brkenerji.com.tr

1.4 Other Entities Involved in the Project

Organization name	Ekobil Environmental Services and Consultancy Ltd. [4]
Role in the project	Preparation of the project description document
Contact person	Aslı Sezer Özçelik
Title	Dr.
Address	Ahlatlıbel Mahallesi, Güneykent Sitesi 1839. Sk. No 56, 06805 Ankara, Turkey.
Telephone	+90 312 489 1338
Email	info@ekobil.com

1.5 Project Start Date

Project start date is 27 December 2012 as indicated on the substantial completion document issued by the ministry of Energy and Natural Resources.

1.6 Project Crediting Period

The project crediting period is 10 years: 27.12.2012-26.12.2022 (both days inclusive). The crediting period is renewable twice.

[4] Registered to the Ankara Chamber of commerce with the registration number 145009 and the full tittle of Ekobil Çevre Hizmetleri Danışmanlık Eğitim Tarım Hayvancılık Madencilik İnşaat İthalat İhracat Turizm ve Ticaret Limited Şirketi (www.ekobil.com)

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	Y
Large project	N

Years	Estimated GHG emission reductions or removals (tCO_2e)[5]
Year 0: 2012 (27.12.2012 to 31.12.2012)	873
Year 1: 2013	63,761
Year 2: 2014	63,761
Year 3: 2015	63,761
Year 4: 2016	63,761
Year 5: 2017	63,761
Year 6: 2018	63,761
Year 7: 2019	63,761
Year 8: 2020	63,761
Year 9: 2021	63,761
Year.10: 2022 (01.01.2022 to 26.12.2022)	62,888
Total estimated ERs	637,610
Total number of crediting years	10
Average annual ERs	63,761

1.8 Description of the Project Activity

The Project Activity is comprised of the following main parts: a diversion weir to divert the water, a channel connected by two conveyance tunnels and the powerhouse where the turbines are housed. Water will be collected by a controlled weir. The weir will also include two spillway gates, a spill water crest and a fish gate on the left bank. Water will enter the weir from an intake structure and leave the weir from the outlet gates into a 13,435 m conveyance tunnel-channel system. The water will then pass to the turbines via a surge tank and a penstock of 230 m. A gross head of 152 m will be formed (net head 132.14 m) and water will be discharged into four Francis turbines, which are contained within the powerhouse. The electricity will be transmitted via 34.5 kV transmission lines through Yenidere Havza transformer substations, via 11 km

[5] Calculated based on annual electricity production ammount presented in pdf page 243 of the revised feasibility report and the combined margin emmission factor calculated on section 3 of this document.

transmission line. The Project Activity will implement the best available technology and management standards.

To summarize the technical description of the Project Activity, the main technical characteristics obtained from final revised and DSİ approved feasibility report and latest information based on the final water usage agreement of the Project Activity and its general properties of the facilities are provided below (Table 2):

Table 2:General properties of the project facilities

INFORMATION ABOUT INVESTMENT REGION	
1/25.000 Sized Map Names	G35-c2, G36-d1
Project Coordinates	501225, 4510793
Province	Amasya
District	Taşova
Basin Name	Yeşilırmak
River Name / Main Branch Name	Yeşilırmak
Catchment Area (km2)	21,542.80 km²
Average Flow Rate (m3/sec)	46.42 m³/sec
Average Annual Total Flow (hm3)	1,553.48 hm³
Q…..Dam spillway design flow rate (m3/sec)	780.7 m³/sec
REGULATOR TYPE	
Regulator Type	Regulator Type
Crest Altitude (m)	380 m
Maximum Operating Level (m)	378 m
Minimum Operating Level (m)	371 m
Thalveg Altitude (m)	371 m
Powerstation Tail Water Altitude (m)	340 m
Transmission Structure Type	Channel + Tunnel
Transmission Structure Length (m)	13,435 m
Transmission Structure Slope (j)	0.00015(K)/0.00032(T)
PENSTOCK / CHANNEL / TUNNEL	
Penstock Diameter (m)	3 x 3 m + 1 x 1 m
Penstock Length (m)	230 m
Penstock Wall Thickness (mm)	8 mm
TURBİNE INFORMATION	
Turbine Type	Francis
Number of Unıts	4
Gross Head (m)	4 x 38.00 m
Net Head (m)	3 x 33.94 m; 1 x 30,32 m
Project Flow Rate (m3/sec)	3 x 34.23 m³/sec - 1 x 4 m³/sec
GENERATOR INFORMATION	
Installed Capacity (MW)	32.548 MW
Total Energy (GWh)	124,050 GWh
Total Production Hours (h)	
Dam Voltage (kV)	3 x 10.6 kV; 1 x 6.3 kV
Energy Transmission Line Section	33 kV

Energy Transmission Line Length (km)	11 km

The project will be using Four Francis type turbines. The working principle of the Francis turbine is such that the water coming from the penstock is transferred to the inlet scroll, which distributes the water equally around the wicket gates. Water passes through the wicket gates, which controls the amount of water passing through the turbine, before reaching the runner. This in effect controls the power output of the hydroelectric power plant. The wicket gates also adjust the angle of the water reaching to the runner. After passing through the wicket gates, the water reaches the runner. The water pressure forces the runner to rotate. The rotation speed of the runner can be in the range of 80 to 1000 revolutions per minute. The water continues its motion downward under the runner to the exit pipe. The exit pipe discharges the water to the environment as low pressure water. The rotational motion of the runner is transferred to an electric generator. The generated electricity is converted to a high voltage current and is transferred to the grid to be consumed.. The following figure exhibits the working principle of a Vertical axis Francis Turbine (Figure 4):

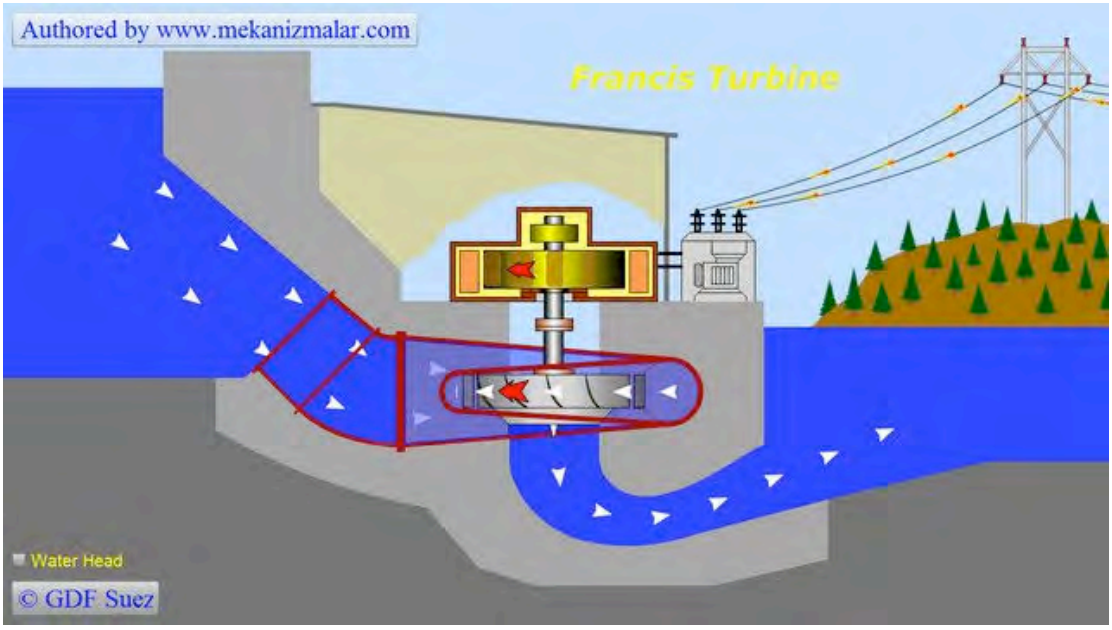


Figure 2: The working principle of a Francis type turbine.

The project owner is granted a production license for 49 years The economic life time of a hydro power plant investment is assumed to be about 50 years, based on the experts' committee report on energy under the 8th development plan published by the State planning organization. Even if the facility can last for 50 years the major equipment needs to be replaced in every 20 years .

The project is expected to produce 124,050 MWh of electricity per year, over the first crediting period. The annual electricity delivered to the grid by the project, would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources. Based on this a combined margin emission reduction factor is calculated as detailed below in Chapter 3 of this document.

1.9 Project Location

The host party is the Republic of Turkey[6].

The Project is located at the Black Sea Geographical Region/ Amasya Province

The following are the exact coordinates of the main project structures, as shown in the following figure (Figure 3).

	Weir	Power House
Latitude:	40°41'14.56"N	40” 44.691’ N
Longitude:	35°53'56.58"E	36” 01.171’ E

Figure 3: Google Earth image showing the exact project location within Turkey, and with respect to Amasya Province.

1.10 Conditions Prior to Project Initiation

There was no other hydroelectric power plant installation at the project location. The project activity does not generate greenhouse gas emissions, so it can be excluded that the implementation has been made only in order to generate GHG emissions with their subsequent reduction.

[6] The host country Turkey is an Annex 1 country under UNFCCC, and a party to Kyotoprotocol without a binding emission reduction target. For more detail please visit : http://www.mfa.gov.tr/united-nations-framework-convention-on-climate-change-_unfccc_-and-the-kyoto-protocol.en.mfa

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

Addition of a new power generation capacity to the grid is regulated by Energy Market Regulatory Authority (EMRA) who issues the licenses for electricity generation and is responsible for ensuring that new capacity additions are in compliance with its rules and regulations. The list of the rules and regulations of the host country that a new electricity generation project has to comply with is given in Annex 1.

1.12 Ownership and Other Programs

1.12.1 Right of Use

Ownership of the plant, equipment and electricity generation licence belongs to Masat Enerji Elektrik Üretim ve Tic. Ltd. Şti. and all emission reductions/removals are granted to the company. The production license and the operating certification of the company given by the Chamber of Commerce are provided to the validating DOE as proof of the Title.

1.12.2 Emissions Trading Programs and Other Binding Limits

Not applicable

The Project Activity is not embedded under any kind of Emission trading programs. Turkey is not an Annex-B country under Kyoto Protocol, neither has its set national emission reduction targets nor any related obligations.

1.12.3 Other Forms of Environmental Credit

Not applicable

The project will not generate other form of environmental credits such as Green Power Certificates.

1.12.4 Participation under Other GHG Programs

Not applicable

The project is a voluntary project and the host country, Turkey cannot host CDM or JI projects. The project has not been registered under any other voluntary GHG program.

1.12.5 Projects Rejected by Other GHG Programs

Not applicable

The project has not been rejected by any other Green House Gas programme.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

The Project is eligible to be a VCS Project because:

- VCS v.3.3 has taken effect on 04.10.2012, accordingly the Project is eligible to use this version.
- VCS v.3.3 requires project crediting period start date earliest to be 01.01.2002, besides, the Project must also complete the validation within two years of the Project Start Date, which is 24.May 2011. Both conditions are satisfied for the Project activity.
- VCS v.3.3 accepts all six Kyoto Protocol gases. The Project aims to reduce CO_2, which is one of these six Kyoto Protocol gases.
- VCS v.3.3 accepts all technologies supported by a VCS approved GHG program. The Project is a hydropower plant, the technology of which is included in the UNFCCC- CDM sectoral scope 1.
- VCS v.3.3 requires the use of one of the VCS program approved project methodologies. The Project activity uses the tools and methodologies of approved by UNFCCC CDM executive board, which is a VCS approved program.
- The project does not benefit from any kind of Official Development Assistance.
- The host country is a party to UNFCCC and Kyoto protocol but Turkey does not have any binding emissions reduction target thus the project is eligible for VCS.

- In addition to the above, the project is not a grouped project activity, nor de-bundled part of a grouped project activity

Leakage Management

Not Applicable as the project is a green field project.

Commercially Sensitive Information

A detailed Excel workbook summarizing the financial analysis is provided to the validating DOE with relevant evidences that are commercially sensitive, these will not be disclosed to public.

Further Information

No Further information to be added.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

Approved consolidated baseline and monitoring methodology ACM0002 “Large-scale Consolidated Methodology; Grid-connected electricity generation from renewable sources.” Version 14.0.0.

The Approved Methodology refers to the following tools:

“Tool for the demonstration and assessment of additionality” (Version 07.0.0; EB 70 -Annex 8)

“Tool to calculate the emission factor for an electricity system”. (Version 04.0.0;EB 75-Annex 15)

"Guidelines on the assessment of investment analysis” (Version 5; EB62-Annex 5)

2.2 Applicability of Methodology

The ACM0002 (version 14.0.0) methodology is applicable to grid-connected renewable power generation project activities that: (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).

The choice of methodology ACM0002, Version 14.0.0, is justified as the project activity meets the following applicability criteria:

Reference page in ACM0002 (version 14.0.0)	**Applicability Criteria**	**Justification**
4	The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;	The project activity is the Installation of a new hydro power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant)
4	In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on page 10 to calculate the parameter EGPJ,y): the existing plant started commercial operation prior to the start	Not applicable as the project is not a capacity addition

	of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	
6	In case of hydro power plants, one of the following conditions must apply:	
6	The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of reservoirs; or	Not Applicable as the project activity is the addition of a new hydro power plant thus a new reservoir.
6	The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of reservoirs is increased and the power density of each reservoir, as per the definitions given in the project emissions section, is greater than 4 W/m2; or	Not Applicable as the project activity is the addition of a new hydro power plant thus a new reservoir.
6	The project activity results in new single or multiple reservoirs and the power density of each reservoir, as per the definitions given in the project emissions section, is greater than 4 W/m^2.	The project activity results in new reservoirs and the power density of the project activity is 1251.85 W/m^2 which is greater than 4 W/m^2 as shown in the following calculation: Project Activity | Installed Capacity / Reservoir Area[7] = Power Density Midilli HPP | 33,548 W / 26,000 m^2 = 1251.85 W/m^2
6	In case of hydro power plants using multiple reservoirs where the power density of any of the reservoirs is lower than 4 W/m^2 all the following conditions must apply: The power density calculated for the entire project activity using equation 5 is greater than 4 W/m^2; Multiple reservoirs and hydro power plants located at the same river and where are designed together to function as an integrated project[8] that collectively constitute the generation capacity of the combined power plant; Water flow between multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity;	Not Applicable as the project activity is going to result in only one single reservoir.

[7] The reservoir volume Area curve that indicates the aerial extent of the reservoir at maximum operation level is provided in Annex 5.

[8] This requirement can be demonstrated, for example: (i) by the fact that water flow from upstream power units spilling directly to the downstream reservoir; or (ii) through the analysis of the water balance. Water balance is the mass balance of water fed to power units, with all possible combinations of multiple reservoirs and without the construction of reservoirs. The purpose of such water balance is to demonstrate the requirement of specific combination of multiple reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum three years prior to implementation of CDM project activity.

	Total installed capacity of the power units, which are driven using water from the reservoirs with power density lower than 4 W/m^2, is lower than 15 MW; Total installed capacity of the power units, which are driven using water from reservoirs with power density lower than 4 W/m^2, is less than 10% of the total installed capacity of the project activity from multiple reservoirs.	
6	The methodology is not applicable to the following: Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; Biomass fired power plants; A hydro power plant[9] that results in the creation of a new single reservoir or in the increase in an existing single reservoir where the power density of the power plant is less than 4 W/m^2.	The project activity is eligible because: • t is not involving switching from fossil fuel at the site of the project activity, • It is not a biomass powered power plant • Project activity is resulting in the creation of a new reservoir but the power density is not less than 4 W/m^2. But instead it is greater than 4 W/m^2.
6	In the case of retrofits, replacements, or capacity additions, the ACM0002 (version 13.0.0) methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	Not applicable as the project activity is the installation of a new hydro power plant and all the equipment that will be installed will be brand new.
Footnote 3 pg.6	The condition in the "Combined tool to identify the baseline scenario and demonstrate additionality that all potential alternative scenarios to the proposed project activity must be available options to project participants" does not apply to this methodology, as this methodology only refers to some steps of this tool.	

[9] The ACM002 (version 13.0.0) indicates that "…project participants wishing to undertake a hydroelectric project activity that result in a new reservoir or an increase in the existing reservoir, in particular where reservoirs have no significant vegetative biomass in the catchments area, may request a revision to the approved consolidated methodology".. ;In the case of the project activity as the power density is greater than 4 W/m^2, there is no need for such a claim or revision request. .

2.3 Project Boundary

Table 3 exhibits the gases included in the project boundary. CO_2 emission is included in the baseline but the project activity does not emit any of the gases listed, in Table 4.

The project boundary includes net electricity generated and supplied to the Turkish national grid.

Table 3: Main gases included in the project boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Electricity generation in baseline (Turkey's Grid)	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
		Other	N.A.	N.A.
Project	Emission from the reservoir of the proposed project	CO_2	No	Minor emission source
		CH_4	No	Minor emission source (Power density (1251.85 W/m^2) greater than $10W/m^2$)
		N_2O	No	Minor emission source
		Other	N.A.	N.A.

2.4 Baseline Scenario

Since the proposed project activity is the installation of a new grid-connected hydroelectric, that is renewable power plant and therefore, the baseline scenario is defined as the following based on ACM0002 (Version 14.0.0):

"Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the. Tool to calculate the emission factor for an electricity system (v.03.0.0; EB 70-Annex 22)."

Since the proposed project activity is going to be connected to the Turkish national grid, the baseline scenario of the proposed project is the supply of the equivalent amount of annual power output by the existing Turkish national grid which is the continued operation of existing power plants and the addition of new sources to meet electricity demand.

Based on ACM002, baseline emissions are equal to power generated by the project activity that is delivered to the Turkish national grid, multiplied by the baseline emissions factor. This baseline emissions factor (EFy) is calculated as the Combined Margin (CM), of which the breakdown and detailed description is given below in chapter 3.

2.5 Additionality

The proposed project activity reduces GHG emissions by substituting fossil fuel based electricity generation by renewable resources (hydro) based electricity generation.

This part refers to the "Tool for the Demonstration and Assessment of Additionality Version 7.0.0" and the numbering in this section reflects the Tool's Guidelines provided at EB 70, Annex 8.

Step 1 - Identification of Alternatives to the project activity consistent with current laws and regulations

Sub-step 1a - Define alternatives to the project activity:

The tool notifies that "Project activities that apply this tool in context of approved consolidated methodology ACM0002, only need to identify that there is at least one credible and feasible alternative that would be more attractive than the proposed project activity."

The project alternative can be defined as follows:

> Continuation of the current situation (No project activity or other alternatives undertaken). This alternative is the most likely scenario, since there are no legal obligation to implement such a project and without VCS support the project implementation is financially not attractive.

Outcome of Step 1a: The only realistic and credible alternative scenario to the project activity is Continuation of the current situation, without any project undertaken .

Sub-step 1b. Consistency with mandatory laws and regulations:

The project alternative, the baseline scenario, which is the continuation of the existing situation, is in compliance with all mandatory applicable and legal and regulatory requirements. Also the alternative scenario of addition of a new power generation capacity to the grid is regulated by Energy Market Regulatory Authority (EMRA) who issues the licenses for electricity generation and is responsible for ensuring that new capacity applies with its rules and regulations. The list of the rules and regulations of the host country that a new electricity generation project has to comply with is given in Annex 1.

Outcome of Step 1b: The alternative scenario to the project activity is the supply of electricity by the existing grid with additional capacity is in compliance with mandatory legislation and regulations.

Step 2 - Investment analysis

At this step it will be demonstrated that "*the proposed project activity is not the most economically or financially attractive" option*. Please note that, at this step, the "Guidelines on the assessment of investment analysis" (EB 62 Report Annex 5) Version 05 is followed.

Sub-step 2a - Determine appropriate analysis method

There are three options for investment analysis method:

- Simple Cost Analysis
- Investment Comparison Analysis and
- Benchmark Analysis

"Simple Cost Analysis" is not applicable for this project activity as the project generates economic benefits from sale of electricity to the Turkish national grid". Investment Comparison Analysis is also eliminated since the baseline for the project is "the generation of electricity by the existing grid" and no similar investment alternatives exist. Therefore, Benchmark Analysis is the most appropriate approach for the evaluation of the project activity.

Sub-step 2b - Option III-Apply benchmark analysis

Internal Rate of Return (IRR) on equity is taken for this project to be the financial indicator for assessing the financial viability of the project activity..

Equity IRR is the cash flow return to equity shareholders after debt repayments. And therefore also takes into account the debt repayments. Equity IRR takes into consideration that you use debt for the project, so the inflows are the cash flows required minus any debt that was raised for the project. The outflows are cash flows from the project minus any interest and debt repayments.

To be able to assess the financial viability of the project a benchmark to compare the equity IRR is needed.

The Tool for the Demonstration and Assessment of Additionality Version 7.0.0 (EB 70, Annex 8) and the Guidelines issued at EB 62 state that "...Discount rates and benchmarks shall be derived from: Government bond rates, increased by a suitable risk premium to reflect private investment and/or the project type, as substantiated by an independent (financial) expert or documented by official publicly available financial data"

The Guidelines issued at EB 62[10], provides the default values for the expected return on equity as an appendix, and Moody's index values of most of the CDM Countries. At the time of investment decision (2007 see table 1), Turkey's Moody's index (Ba3-Stable[11] between 2005 to 2009) was comparable to country's with the same Moody's index, and same default benchmark value from this point of view a rreasonable and appropriate benchmark to compare the Equity IRR can be taken as 12.75 %.

Sub-step 2c - Calculation and comparison of financial indicators

The following parameters are taken into account for the assessment of the investment (Table 5) and supplementary parameters are provided in the "MidilliFinancialAnalysis" workbook and submitted to the validating DOE.

[10] Annex 5 Guidelines on The Assessment of Investment Analysis (Version 05)
[11] http://countryeconomy.com/ratings/turkey

Table 4: Major parameters taken into account for the financial analysis and determination of the Equity IRR of the Midilli HPP Project:

Parameter	Value	Unit	References
Installed Capacity	32.55	MWe	Electricity Generation License of the project activity.
Expected Annual Electricity Generation	124,050		Electricity Generation License of the project activity page 6 and page 243 of revised feasibility report..
Expected Average Annual Emission Reduction (ER)	63,761	tCO_2e	Calculated (see Chapter 3 for details) based on the electricity production values.
Total Investment	Confidential	USD	Based on FSR and based on VAT calculations
Annual Operation Costs	Confidential	USD	Based on FSR and based on labour cost calculations.
Loan	Confidential	USD	Loan Agreement
Loan Period	10	years	Loan Agreement
Electricity Sales Price	0.073	USD/KWh	Price Guaranteed by the renewable energy law number 5346
VAT	18	%	V.A.T. Law No:3065
Income Tax	20	%	Income Tax Law number 5281

The value of the investment has been depreciated on a reducing balance basis over 20 years, 75 % of the long lasting assets are depreciated over 45 years and the residual book value of 23,527,547.55 USD is added back to the cash flow. The economic life time of a hydro power plant investment is assumed to be about 50 years, based on the experts' committee report[12] on energy under the 8th development plan published by the State planning organization. Even if the facility can last for 50 years the major equipment needs to be replaced in every 20 years[13]. As a result the project lifetime is estimated to be about 20 years and the investment analysis is therefore done for a time frame of 20 years.

For the assessment of the viability of the project activity the Equity IRR is compared to the benchmark. The equity IRR is worked out as 10.32 %, which is below the benchmark of 12.50%.

Sub-step 2d - Sensitivity Analysis

To be able to conclude if the investment decision is the financially the most attractive alternative or not, a sensitivity analysis is performed. Three parameters that affect the equity IRR are examined for the sensitivity analysis:

- Investment Cost
- Operating and Maintenance Cost
- Electricity Revenue

[12] http://ekutup.dpt.gov.tr/enerji/oik585.pdf page 4.25 (Last visited on 3/3/2011)
[13] http://ekutup.dpt.gov.tr/enerji/oik585.pdf page 4.26 (Last visited on 3/3/2011)

The sensitivity analysis is performed for a range of ±10% fluctuations in the above parameters. The figures in the following table (Table 6) are obtained. Following the "Guidelines on the assessment of investment analysis (Version 05)" of EB 62 Annex 5 when any of the key variables are increased or decreased by at least 10%, and the benchmark is not exceeded (also see Figure 5).

Table 5: Sensitivity analysis for the Equity IRR without carbon revenue for the project (Benchmark: 12.75%)

Change	-10%	-5%	5%	10%	Exceed Benchmark?
Investment Cost	12.46%	11.30%	9.47%	8.73%	No
Operating Cost	10.41%	10.37%	10.28%	10.23%	No
Electricity Revenue	8.97%	9.65%	10.98%	11.63%	No

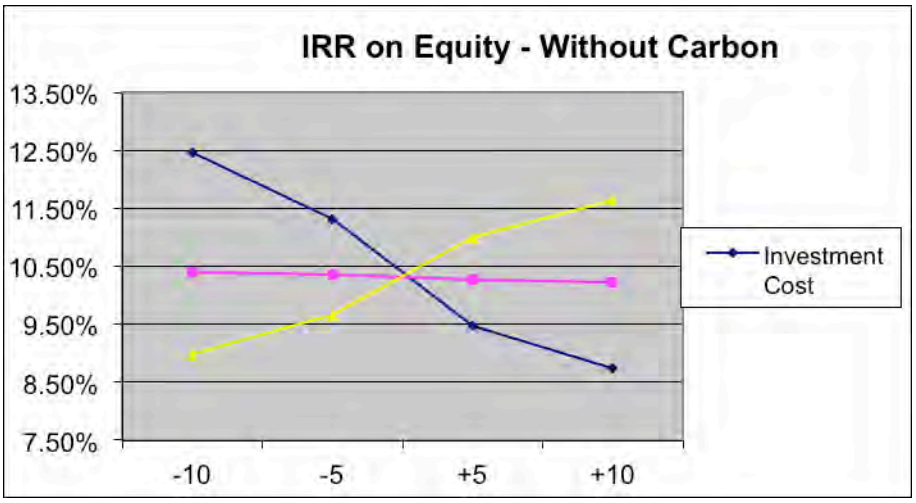


Figure 4: Sensitivity analysis: Fluctuation of the Equity IRR without the carbon revenue, by changing major parameters that effect the Equity IRR by ±10%

To exceed the benchmark, the electricity revenue must increase by about 18.70 % over the life of the project, or the investment cost must be reduced by about 11.13 %. The Renewable energy law only guaranties a minimum price of USD 0.073 per kWh for renewable energy and the price , and the price that was announced at the EMRA web site was approximately 6.4 US cents[14],, indicating that our estimation for the renewable energy price was reasonable. However, we do not expect an increase in the electricity revenue related to a price increase and since the feasibility report and the design of the project is based on the maximum available capacity of the Yeşilırmak river, and since our entire financial analysis is based on the maximum net electricity output of the project, such an increase based on an increased amount of electricity generation is very unlikely. In addition to that as the availability of the water decreases due to the globally accepted results of global climate change, electricity production is very unlikely to reach to an increased generation amount of an additional 18.70 %. In addition to this the climate change models indicate for the

[14] The officially announced price for the time of investment decision was 9.67 ykrs/ kWh this converts to approximately 6.4 Dolar Cents. http://www.epdk.gov.tr/documents/elektrik/mevzuat/kurul_karar/elektrik/Elk_Tarife_Top_Sts_Tetas_2007.zip

Mediterranean basin an increased drought and water scarcity that could even risk the project to reach the firm energy values.

The investment costs we have considered in our financial analysis was based on the third party prepared revised feasibility report that was available to the project owner at the time of investment decision. Therefore these numbers are reasonable and reflect the average market conditions but are unlikely to go down, as the focus of the project developer is to secure and improve the electricity yield and therefore they will not be able to cut costs. Therefore it is very unlikely for the investment cost to finalize below the amounts estimated and shown in the financial analysis.

Outcome of Step 2:

Without the VER revenue the Internal Rate of Return of the project cannot get close to the benchmark of 12.50 %, with an equity internal rate of return of 10.32%. A fluctuation of ± 10% in the key parameters also does not make the project exceed the benchmark.

Step 3 - Barrier Analysis

As the investment analysis concludes that the proposed project activity is unlikely to be the most financially attractive option, the sub step 3- Barrier analysis is optional to be applied and barrier analysis is not considered for the Midilli HPP.

Step 4: Common Practice Analysis

Sub-step 4a. Analyse other activities similar to the proposed project activity

As per “Tool for the Demonstration and Assessment of Additionality”, projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory frame-work, investment climate, access to technology, access to financing, etc. Although the tool does not consider the Sectoral Scope 1: Energy industries (renewable-/non -renewable sources) projects amongst the measures that can make use of the common practice guideline version 02, we preferred to utilise the same guideline to demonstrate that within the boundaries of the Yeşilırmak catchment (see Figure 5 for the borders of the differentiated geographical region) there are no similar projects that are developed and operational without the assistance of the VER revenue. According to the Guidelines on Common Practice (version 02), common practice analysis is presented through the following 4 steps.

Common Practice tool Step 1: Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity:

As a hydropower project, the installed capacity is chosen as an appropriate proxy for “similar scale”. The power generation capacity of 32.548 MW of the proposed project is selected as the design capacity. Therefore, the range from 16.274 to 48.82 MW is considered as applicable capacity.

Outcome of Step 1: Applicable output range is 16.274 MW to 48.82 MW.

Common Practice tool Step 2: identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:

(a) The projects are located in the applicable geographical area;

(b) The projects apply the same measure as the proposed project activity;

(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;

(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;

(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;

(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity[15].

The host country is geographically divided into 25 catchments as shown in the following figure (Figure 5). As can be seen from the figure the project site is located within the borders of the Yeşilırmak Catchment. Yeşilırmak and its major tributary Kelkit River constitute the Yeşilırmak River Catchment. Therefore we have considered the geographical boundary of our common practice analysis as the Yeşilırmak Catchment, and we have checked the hydropower plants that are operational, within the range defined in step 1 (16.274 MW to 48.82 MW) and located on the Kelkit or Yeşilırmak Rivers. These are listed on Table 6:

Figure 5: The 25 Water Catchments areas identified in Turkey.[16]

[15] While identifying similar projects, project participants may also use publicly available information, for example from government departments, industry associations, international associations on the market penetration of different technologies, etc.
[16] Source: The longterm Catchment Management Plans of Turkey.

Table 6: Power Plants that are operational on Yeşilırmak and Kelkit Rivers as of 11 April 2012 (as announced by the DSI as an answer to a question asked by a parliament member in the Turkish National Assembly[17]).

Name of Facility	Ownership	Capacity	Province	DSI District	VER STATUS
Almus HPP	Government (EUAS)	27	Tokat	07 Samsun	
Koyulhisar HPP	Private	42	Sivas	07 Samsun	VCS 713
Çamligöze HPP	Government (EUAS)	32	Sivas	19 Sivas	
Kumköy HPP	Private	17.5	Samsun	07 Samsun	VCS 986
Niksar HPP	Private	40.2	Tokat	07 Samsun	VCS 1019
Reşadiye II HPP	Private	26.1	Tokat	07 Samsun	GS 644
Reşadiye III HPP	Private	22.3	Tokat	07 Samsun	GS 645
Tuna HPP	Private	37.2	Tokat	07 Samsun	VCS 668
Yavuz HPP	Private	22.5	Amasya	07 Samsun	

Outcome of Step 2:

There are 9 projects within the comparison range of the project activity.

Step 3: within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all}.

The above list covers all the power plants within the geographical boundary defined above (as Yeşilırmak River Catchment). Checking all the power plants within the capacity range determined in Step 1, and looking projects that have started commercial operation before the start date of the project, and eliminating the ones that do claim VER credits, we end up with the following table (Table 7):

Table 7 : The list of hydroelectric power plants that are identified to be counted in the N_{all} list.

Name of the Power Unit	Ownership	Capacity (MW)	Mean Production (GWh)	Firm Production (GWh)	Province	Town
Yavuz HES	Private	22.5	83.0	47.0	Amasya	Tasova
Çamligöze	Government	32	102.0	68.0	Sivas	Su Şehri
Almus Dam	Government	27	99.0	39.0	Tokat	Almus

Therefore the number of N_{all} is 3.

N_{all}=3

http://www.google.com.tr/url?sa=t&rct=j&q=su%20havzalari%20haritasi&source=web&cd=3&ved=0CD4QFjAC&url=http%3A%2F%2Fwww.ormansu.gov.tr%2Fosb%2FLibraries%2FDok%25C3%25BCmanlar%2FUHYS.sflb.ashx&ei=QvouUa-qJunJ0QWR7ICYBg&usg=AFQjCNHKcm_cvp8c0e22N1f72EUci81Hsg&bvm=bv.43148975,d.d2kiv

[17] http://www2.tbmm.gov.tr/d24/7/7-2933sgc.pdf

Step 4: within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff}.

When we consider the project listed in Step 3, the projects differ from the project activity by the following aspects:

Çamlıgöze HPP and Almus Dam are developed by the government so they were developed in a different economic setting or with different motivations:

Yavuz HPP is a private owned project, that was developed by private sector, however the project activity was designed by DSI and was later auctioned and Masat Enerji Elektrik Üretim ve Tic. Ltd. Şti. (Which is also the owner of the project activity that is subject to this Project Description Document) the present project owner won the auction. At the time the Yavuz HPP was developed the project owner was not aware of Carbon finance and the leverage it brings to their projects. On the other hand, we know by the project investment expenditure data filed by the same owner that, it is revealed that the unit cost (cost per MW) of Yavuz has 68 % less than that of Midilli HPP therefore this project is also considered to be different than the project activity.

Outcome of Common Practice tool Step 4 is $N_{diff}=3$

Common Practice tool Step 5: Step 5: calculate factor F=1-Ndiff/Nall representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

$F=1-N_{diff}/N_{all}$

F=1-(3/3)

F=0

Conclusion of Common Practice tool version 2.0 (EB 69 Report Annex 8):

The proposed project activity is a “common practice” within a sector in the applicable geographical area if the factor F is greater than 0.2 and $N_{all}-N_{diff}$ is greater than 3

Factor F is calculated to be 0 < 0.2.

And,

$N_{all}-N_{diff}$ =3-3=0 <3 in that case the Midilli HPP is not common practice.

Conclusion: In conclusion the proposed project is deemed to be additional according to ACM0002 and the tool and guideline for the demonstration and assessment of additionality.

2.6 Methodology Deviations

The UNFCCC methodology of ACM0002/ Version 14.0.0 and its related tools have been applied without many deviations.

With the exception of the below Monitoring parameter :

Data / Parameter:	A_{PJ}
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water, after the implementation of the Project Activity, when the reservoir is full.
Measured /Calculated /Default:	Indirectly measured based on the reservoir area map provided in Annex 5.
Source of data:	Surface area determined using the lake surface area map provided in Annex-5 of this PD.
Description of measurement methods and procedures to be applied:	The reservoir area corresponding to maximum operational level has been determined via the topographic map showing the lake area, presented in Annex 5.
Frequency of monitoring/recording:	IS not going to be monitored as it is fixed and cannot alter.
Value applied:	26,000
Monitoring equipment:	-
QA/QC procedures to be applied:	N/A
Calculation method:	N/A
Any comment:	-

The rational for this can be explained as follows:
Although the methodology (ACM002, v.14.0.0) requires reservoir area to be monitored, since the power density of the project activity is very large, and the area flooded due to the project activity cannot exceed the above given amount (26,000 m2; See also Annex-5: The Map Showing the Reservoir Area of the Project Activity on page 75), the parameter related to the reservoir area is not going to be monitored during the crediting period for Midilli HPP Project.

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

According to the latest version (version 14.0.0) of ACM0002 and the tool to calculate the emission factor for electricity system, since the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

> *Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system" (version 04.0.0 (*EB 75, Annex 15*)).*

The Project therefore applies the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system" (*version 04.0.0 (*EB 75, Annex 15*)*).

Step 1 -*Identify the relevant electricity systems*

As the host country is not participating in the compliance markets hence does not have a DNA, a delineation of the project electricity system and connected electricity systems has not been published yet. For such cases, the tool suggests using the following criteria to determine the existence of significant transmission constraints:

1. *"In case of electricity systems with spot markets for electricity: there are differences in electricity prices (without transmission and distribution costs) of more than 5 percent between the systems during 60 percent or more of the hours of the year."* This criteria is not applicable as there is no spot electricity market in the host country.

2. *"The transmission line is operated at 90% or more of its rated capacity during 90% percent or more of the hours of the year"*: The transmission line operator (TEIAS) or any other official source has not published the capacity usage figures for the Turkish grid, hence this criterion can not be proved.

According to the tool, where the application of these criteria does not result in a clear grid boundary, a regional grid definition in the case of large countries with layered dispatch systems (e.g. provincial / regional / national) shall be used. A provincial grid definition may indeed in many cases be too narrow given significant electricity trade among provinces that might be affected, directly or indirectly, by a CDM project activity. In other countries, the national (or other largest) grid definition should be used by default.

Therefore, for the case of the subject project activity "the project electricity system" and "the connected system" are same, and the Turkish National Grid is used as the "project electricity system". It is also confirmed by TEIAS that the Turkish grid is interconnected. There isn't any independent or regional grid system in any region of Turkey. The map of the Turkish Electricity Grid is given in the below figure (Figure 7):

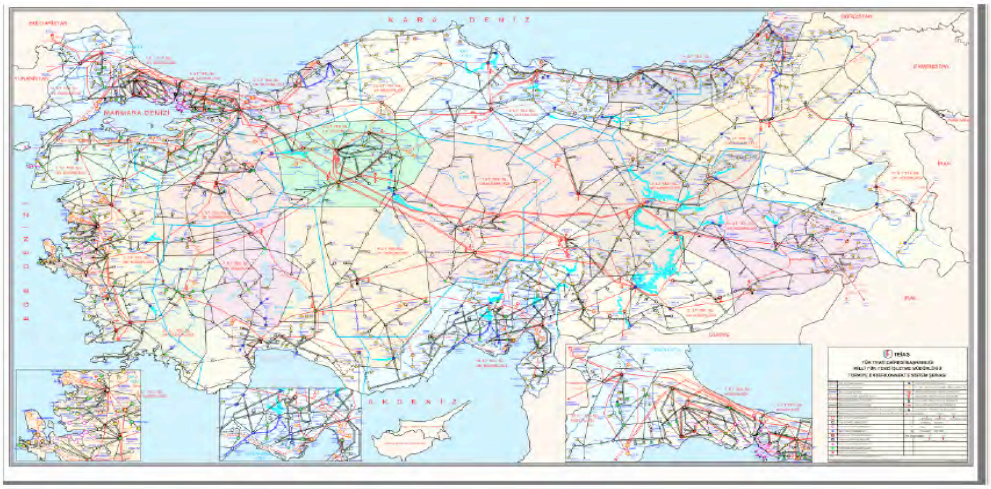


Figure 6: The Map showing the boundaries of Turkish Electricity Grid (Source Electricity Market Report 2010, by Electricity Market Regulatory Authority http://www.epdk.gov.tr/documents/10157/48dd12d4-74da-4dcf-9f48-86983146c0d8)

All the calculations details of which are given below are made for the entire Turkish Grid.

For the purpose of determining the operating margin emission factor, the tool directs us to use one of the following options to determine the CO2 emission factor(s) for net electricity imports from a connected electricity system:

(a) 0 t CO2/MWh; or

(b) The simple operating margin emission rate of the exporting grid, determined as described in Step 4 section 6.4.1, if the conditions for this method, as described in Step 3 below, apply to the exporting grid; or

(c) The simple adjusted operating margin emission rate of the exporting grid, determined as described in Step 4 section 6.4.2 below; or

(d) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in Step 4 section 6.4.4 below.

For imports from connected electricity systems located in Annex I country(ies), the emission factor is 0 tons CO_2 per MWh.

And the tool also notes that the …"Electricity exports should not be subtracted from electricity generation data used for calculating and monitoring the electricity emission factors."

In our case the host country (imports electricity mainly from Annex -1 countries, so the emission factor related to imports is considered to be zero"0".

Step 2 - Choose whether to include off-grid power plants in the project electricity system

The tool requires Project participants to choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.

Option II: Both grid power plants and off-grid power plants are included in the calculation.

In our case, "Option I" has been selected for the calculation of grid emission factor, and only grid power plants are included in the calculation.

Step 3 – Select an operating margin (OM) method

According to the "Tool to calculate the emission factor for an electricity system", version 03.0.0 in calculating the Operating Margin grid emission factor for a given year y ($EF_{grid,OM,y}$), project developers have the option of selecting from four methods:

(a) Simple OM,

(b) Simple adjusted OM,

(c) Dispatch Data Analysis OM, or

(d) Average OM.

As the share of "low cost/must run" resources are below 50% for the five most recent years (Table 8), therefore, in accordance with the Tool, (a) Simple OM method will be used in the calculations.

Table 8: **Share of primary sources in electricity generation, 2008 – 2012**[18]

	2008	2009	2010	2011	2012
Thermal	82.72 %	80.5 %	73.78 %	74.82%	73.02%
Hydro	16.77 %	18.46 %	24.52 %	22.81%	24.16%
Wind & Geothermal	0.51 %	0.99 %	1.70 %	2.36%	2.82%
Total	100 %	100 %	100 %	100 %	100%

Since the Simple OM calculation (option (A)) is selected, the emission factor is calculated by the generation-weighted average emissions per electricity unit (tCO_2/GWh), and averaged over the past three years of all generating sources serving the system, not including low-cost / must run power plants. The tool gives two options for the calculation of $EF_{grid,OM,y}$;

- *Ex-ante* option

  A 3-year generation-weighted average, based on the most recent data available at the time of submission of the VER-PDD to the DOE for validation, without the requirement to monitor and recalculate the emissions factor during the crediting period, or

- *Ex-post* option

  The year in which the project activity displaces grid electricity, with the requirement that the emission factor be updated annually during monitoring.

[18] Annual Development of Installed Capacity Generation in Turkey (1970-2012)
http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/kgucunkullanım(14-22)/14.xls

For the calculation of the Simple OM, the "**Ex-Ante**" option is selected, at the time of PDD submission to the DOE, the data vintages that were most recent at the start of validation, belongs to the years 2010, 2011 and 2012. All the data used in calculation of the Simple OM are taken from the TEIAS website, details of which are given below.

Step 4 - Calculate the operating margin emission factor according to the selected method

The Simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit of net electricity generation (tCO_2/MWh) for all generating power plants serving the system, not including low-cost / must run plants / units. It may be calculated:

- Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit; or
- Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

The following data are available from the Turkish Electricity Transmission Company (TEİAŞ) web site:

- Annual fuel consumption by fuel type[19],
- Annual heating values for fuels consumed for electricity generation[20],
- Annual electricity generation by fuel type, import and export[21]

Taking into consideration the available data Simple OM method Option B is the applicable method for the project activity. Option A requires data on net electricity generation of each power plant / unit and a CO_2 emission factor of each power unit, both of which are not publicly available, for the Turkish electricity grid.

$EF_{grid,OMsimple,y}$, using option B is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost / must-run power plants / units, and based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i (FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y})}{EG_{y,grid}} \qquad (7)$$

Where:

$EF_{grid, OM\ simple,y}$ = Simple operating margin CO_2 emission factor in year *y* (tCO_2/MWh)

$FC_{i,y}$ = Amount of fossil fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)

$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)

[19] Fuel Consumed in thermal P.P.in Turkey by the Electric Utilities (2006-2012) http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/yakıt48-53/49.xls
[20] Heating Values Of Fuels Consumed In Thermal P.Ps In Turkey By The Electric Utilities (2006-2012), http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/yakıt48-53/51.xls
[21] Annual Development of Turkey's Gross Electricity Generation by Primary Energy Resources and The Electricity Utilities (2006-2012)) / (http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/uretim%20tuketim(23-47)/42(06-12).xls)/ Annual Development of Electricity Generation-Consumption and Losses in Turkey (1984-2012), (http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/uretim%20tuketim(23-47)/34(84-12).xls)

$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)

EG_y = Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year *y* (MWh)

i = All fossil fuel types combusted in power sources in the project electricity system in year *y*

y = The relevant year as per the data vintage chosen in Step 3

Step 5 - Calculate the build margin (BM) emission factor:

The tool indicates that, in terms of vintage of data, project participants can choose between one of the following two options:

Option 1: For the first crediting period, calculate the build margin emission factor *ex ante* based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

And ,

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, *ex post*, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

We prefer the Option 1, calculating the Build Margin Emission factor, “ex ante”, for the first crediting period.

The sample group of power units m used to calculate the build margin are determined as per the following procedure, consistent with the data vintage selected above:

a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh);

b) Determine the annual electricity generation of the project electricity system; excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the

generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET-\geq 20\%}$, in MWh);

c) From $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample}); Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin.

According to the tool in terms of vintage of data, project participants can choose either the ex-ante option or the ex-post option. Between these two options, Option 1 is selected. For the first crediting period, the build margin emission factor is calculated ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor will be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period will be used. This option does not require monitoring the emission factor during the crediting period.

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EG_{EL,m,y}}{\sum_m EG_{m,y}}$$

Where:

$EF_{grid,BM,y}$ = Build margin CO2 emission factor in year y (tCO_2/MWh)

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)

$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (tCO_2/MWh)

m = Power units included in the build margin

y = Most recent historical year for which electricity generation data is available

According to the tool, the CO_2 emission factor of each power unit m ($EF_{EL,m,y}$) should be determined as per the guidance in step 4 (a) for the simple OM, using options A1, A2 or A3, using for y the most recent historical year for which power generation data is available, and using for m the power units included in the build margin. Taking into consideration the available data on the capacity additions, the formula given under Option A2 of the Simple OM option A is used to calculate $EF_{EL,m,y}$.

The CO_2 emissions from the most recent capacity additions are calculated by multiplying the $EF_{EL,m,y}$ values calculated for each fuel source by the annual generation of that fuel source (Table 15). The emission factor has been taken as “zero” for the renewable and wastes and the generation efficiencies for the thermal power plants type of which are not known are taken as 60% which is generation efficiency for the combined cycle natural gas power plants. The Build

Margin Emission Factor for each year is calculated by dividing the total CO_2 Emissions of the subject year by the total generation from the capacity additions of the same year.

The Build Margin Emission Factor of the grid is then calculated as an average for the years 2010 and 2011, as explained in the part where the actual calculations are shown, the assessed capacities added in these two years constitutes our SET_{sample}.

Step 6 - Calculation of the combined margin emissions factor

Finally, the combined margin grid emission factor ($EF_{grid,CM,y}$) is expressed as the weighted average of the Operating Margin emission factor ($EF_{grid,OM,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$):

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$

Where:

$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year *y* (tCO_2/MWh)
$EF_{grid,OM,y}$	Operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
w_{OM}	Weighting of operating margin emissions factor (%)
w_{BM}	Weighting of build margin emissions factor (%)

Where weights w_{OM} and w_{BM} are by default 0.50 and 0.50 according to the selected methodology. And EF_{OM} and EF_{BM} are calculated as described in the previous steps.

Then baseline emissions (BE_y) are obtained as:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$

Where:

BE_y	=	Baseline emissions in year *y* (tCO_2/yr)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO_2 emissions factor in year *y* (tCO_2/MWh)

And

$$EG_{PJ,y} = EG_{facility,y}$$

$EG_{facility,y}$	=	Quantity of net electricity generation supplied by the project plant to the grid in year *y* (MWh/yr)

The *ex-ante* emission reductions (ER_y) are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y = Emission reductions in year *y* (tCO_2)
BE_y = Baseline emissions in year *y* (tCO_2)
$PE_{,y}$ = Project Emissions in year *y* (tCO_2)

As methodology states the PEy in case of a hydro power project with a power density > 10 W/m^2 (that is 243.8 W/m^2 for the Project Activity) to be zero hence ERy = BEy

3.2 Project Emissions

As the methodology states the PEy in case of a hydro power project will be calculated:

"Emissions from water reservoirs of hydro power plants ($PE_{HP,y}$)

For hydro power project activities that result in new reservoirs and hydro power project activities that result in the increase of existing reservoirs, project proponents shall account for CH_4 and CO_2 emissions from the reservoir, estimated as follows:"

"...the power density of the project activity (PD) is greater than 4 W/m^2 and less than or equal to 10 W/m^2:"

Capacity (W)	/	Reservoir Area (m^2)	=	Power Density (W/m^2)	>10 (W/m^2)
32,548,000	/	26,000	=	1251.85	>10 (W/m^2)

The project has a power density of 1251.85 W/m^2 therefore

$$PE_{HP,y} = 0$$

Where:

$PE_{HP,y}$ Project emissions from water reservoirs (tCO_2e/yr)

Although there will be an emergency/back up diesel generator installed within the project boundary, the emissions from these have been deemed negligible as per the ACM0002 (version 14.0.0) methodology, since it will be solely utilized in case of an emergency, such as a power outage.

In addition to this Although the methodology (ACM002, v.14.0.0) requires reservoir area to be monitored, since the power density of the project activity is very large, and the area flooded due to the project activity cannot exceed the above given amount (26,000 m2; See also Annex-5: The Map Showing the Reservoir Area of the Project Activity on page 75), the parameter related to the reservoir area is not going to be monitored during the crediting period for Midilli HPP Project.

3.3 Leakage

There are no leakage emissions related to project activity.

3.4 Net GHG Emission Reductions and Removals

Ex-ante calculation of emission reductions:

Simple Operating margin (OM)

As also explained above, for the computation of the Simple OM, the Ex-Ante option is selected, at the time of PD submission to the DOE, the data vintages that were most recent, belongs to the years 2010, 2011 and 2012. All the data used in calculation of the Simple OM are taken from the TEİAŞ website, details of which are given below. Taking into account the available data "Simple OM" method "Option B" is the appropriate method for the project activity. TEİAŞ publishes the annual heating values of the fuels consumed in the power plants, the heating values are directly related to fuel consumption and are used to calculate average Net Calorific Values (TJ/kt) (Table 9).

The heating values of fuels consumed in thermal power plants are announced by TEİAŞ, the unit of the heating values are Tcal. Tcal is converted to GJoule by using the conversion factor 1cal = 4.1868 Joule. Then the heating values in GJ are divided by Fuel Consumption ($FC_{i,y}$) to get the Net Calorific Values of the fuels consumed in TJ/kt as follows:

Table 9: Net Calorific Values for each fuel type for Turkey

Fuel Type	NCV (TJ/kt)		
	2010	2011	2012
Hard Coal+ Imported Coal	22.32	22.79	24.34
Lignite	7.13	7.30	7.03
Fuel Oil	40.23	41.58	41.70
Diesel Oil	43.09	43.15	44.71
LPG	0.00[13]	0	0.00
Naphtha	33.50	0	0.00
Natural Gas	37.38	37.10	36.95

The emission factors of fuels required are taken from IPCC 2006 guidelines for GHG inventories[22]. All data used for the calculations can be found in Annex-2 (See Table 1 and Table 2 in Annex -2). Table 10 shows total CO_2 emission by fuel types calculated using lower IPCC emission factors and available data from the TEİAŞ website.

Table 10: Calculation of emission by electricity generation (2010-2012)

	Default CO_2 Emissions (tCO_2)		
	2010	2011	2012
Hard Coal+Imported Coal	15,365,199.79	22,366,901.55	28,675,651.54
Lignite	36,745,389.26	40,801,815.79	39,574,682.13
Fuel Oil	2,708,730.18	52,086,506.72	53,423,214.73
Diesel Oil	63,674.50	1,604,878.16	1,745,037.36
Lpg	0.00	39,996.20	497,634.67
Naphtha	30,502.68	0.00	0.00

[22] Table 2.2.Default Emission Factors for Stationary Combustion in the Energy Industries, Vol.2. Energy, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, (http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf)

Natural Gas	44,215,362.69	0.00	0.00
TOTAL	99,128,859.11	110,822,747.76	123,916,220.44

Net electricity generated and supplied to the grid by thermal power plants has been calculated using data obtained from TEİAŞ web page. The ratio between total gross and total net generation (including low-cost/must run plants) has been calculated for each year. The same ratio is assumed to be valid for all thermal plants and total net generation by the plants has been calculated accordingly. Summing up total net generation with the imported electricity, total supply excluding low cost / must run sources for each year is determined and given in Table 11.

Table 11: Net Electricity Generation from thermal power plants (units in GWh)

	2010	**2011**	**2012**
***Net Generation* (GWh)**	203,046.10	217,557.70	227,707.30
***Gross Generation* (GWh)**	211,207.70	229,395.10	239,496.80
Net/Gross Ratio	0.9613575	0.9483973	0.9507739
***Net Thermal Generation* (GWh)**	149,806.03	162,781.31	166,263.44
***Electricity Imports* (GWh)**	1,143.80	4,555.80	5,826.70
***EG_y* (GWh)**	150,949.83	167,337.11	172,090.14
***EG_y* (MWh)**	150,949,827.21	167,337,105.18	172,090,143.41

The OM Emission Factor for the years 2009, 2010 and 2011 are calculated by dividing the total CO_2 emissions for those years (Table10) to the Net Electricity Generation (Table 12) for the subject year. The annual OM emission factors are calculated as follows (Table 13):

Table 12: Annual OM Emission Factors

Year	OM Emission Factor
2010	0.65670
2011	0.66227
2012	0.72007

Finally, OM emission factor is calculated as a generation weighted average for the three most recent years. The resulting OM Emission Factor is;

$EF_{grid,OMsimple}$ =0.68084

Build Margin (BM)

As mentioned above we have preferred the Option 1, calculating the Build Margin Emission factor, “ex ante”, for the first crediting period.

The sample group of power units m used to calculate the build margin are determined as per the following procedure, consistent with the data vintage selected above:

a) Identify the set of five power units, excluding power units registered as CDM project activities that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh);

b) Determine the annual electricity generation of the project electricity system; excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET-\geq 20\%}$, in MWh);

c) From $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample}); Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin.

From a source by the host country licencing body we have determined the commissioning dates of the units in 2012. Accordingly the amount of electricity produced by the newly added 5 units or the $SET_{5\text{-units}}$ are shown in the below table (Table 13):

Table 13: The List of the recently added five units to the host country that makes up the $SET_{5\text{-units}}$.

Name of Unit	Fuel	Capacity (MW)	Project Production Potential (GWh)	Firm Production GWh	Date of Commissioning
Acarsoy NGCCP[23]	Natural Gas	50	375	375	27/12/12
Ales NGCCP	Natural Gas	49	370	370	29/12/12
Bağıştaş II HPP	Hydro	32.4	122	69	23/12/12
Fındık I HPP	Hydro	11.25	48	27	27/12/2012
Tuğra Weir and HPP	Hydro	4.9	18	10	29/12/12
			Total	851	

Source: http://www.enerji.gov.tr/yayinlar_raporlar/2012_Yili_Enerji_Yatirimlari.xls

The net electricity generation in year 2012 is taken as reference for determination of plants that comprise 20% of the system generation. Based on Turkey's Annual Electricity statistics published on the TEIAŞ web site (www.teias.gov.tr) , the net generation in year 2012 was 227,707.3 GWh (See Table 11, in 2012, out of this amount 13,629.40 GWh was identified[24] to be produced by projects that claimed VERs, excluding this number from the net generation we end up with 214,077.90 GWh of electricity which is determined as AEG_{TOTAL} and 20% of that amount is calculated as 42,815.58 GWh.

As $AEG_{SET\text{-}5\text{-}units}$ only produces 851 GWh, a number which is much less than 20% of AEG_{TOTAL}, it is therefore obvious that 20% of AEG_{TOTAL}, is higher than $AEG_{SET\text{-}5\text{-}units}$.

Therefore the 20% of AEG_{TOTAL} with a value of 42,815.58 GWh is to be compared to the capacity additions in the recent years, and used as AEG_{SAMPLE} to calculate Build Margin Emission Factor.

[23] NGCCP: Natural gas combined cycle plant
[24] A list of units providing electricty to the year 2011 Turkish Electricity Grid is provided as an Annex 1 to the most recent Capacity Projection report published by TEIAS (http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2012.pdf). We have checked and identified the units that have claimed VERs by comparing the list to the Gold Standard registry (https://gs2.apx.com/myModule/rpt/myrpt.asp?r=111) and VCS Project Database (http://www.vcsprojectdatabase.org). This list is provided to the validating DOE.

Summing up the electricity generations of all the plants added to the Turkish National Grid in 2012, 2011, and adding up those power plant units added in 2010 between 7th of October to 31st of December 2010 to reach the 20% of AEG_{TOTAL} , but excluding the projects that claimed VERs, the total generation in this period (7 October 2010 to 31 December 2012) up to 46,608.08 GWh.

The total generation by the power plants added in year 2012 is 13,787.45 GWh. This number is still smaller than the $AEG_{SET\ 20\%}$ value of 46,608.08 GWh. Therefore, to reach the $AEG_{SET\ 20\%}$ all the units added in year 2011 are also added, which is 15,454.53 GWh. Yet the sum of year 2012 and 2011 generation is still less than the $AEG_{SET\ 20\%}$ (13,787.45 +15,454.53= 29,241.98 GWh< 42,815.58 GWh). So when we start adding the units added in year 2010, starting with the recent most ones we come up to 9,826.11 GWh, which is less than the gap to fill the gap upto $AEG_{SET\ 20\%,}$ so we added a natural gas powered power plant, producing 7540 GWh (which is more than the amount needed [3746.91 GWh] but we needed to take the entire units generation as implied by the tool) that was commissioned on October 7, 2010 and As a result, the $AEG_{SET\ Sample}$ value we are using in our BM calculation reached up to 46,608.08 GWh and this number is greater than the 20% of the total generation, So only the power plants added in the last 27 months, excluding those claiming VER credits, are used in the calculations. As there is no power unit older than 10 years this number is being used for Build Margin Calculations.

The lists of most recent capacity additions to the grid by year and their average and firm generation capacities for the years 2010, 2011 and 2012 are available as Annex-2 to the capacity projection reports published in the TEIAS web page. Although the annual generation capacity data for each plant is not available on the statistics page of TEİAŞ. The data for the years 2012[25], 2011[26] and 2010[27] are taken from the TEİAŞ Capacity Projection Reports which are also available in another section of the TEİAŞ website. For the capacity additions, the firm generation capacities of the power plants are used. The units that are taken out of the grid are not taken into consideration. All the data used for calculations can be found in Annex-2 (see Table 8a and Table8b).

According to the tool in terms of vintage of data, a project participant can choose either the ex-ante option or the ex-post option. As explained above, out of these two options, Option 1 is selected. For the first crediting period, the build margin emission factor is calculated ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor will be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period will be used. This option does not require monitoring the emission factor during the crediting period.

[25] TEIAŞ Capacity Projection Report 2013- 2017 (http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/KAPASITEPROJEKSIYONU2013.pdf)
[26] TEİAŞ Capacity Projection Report 20010-2019 (http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf)
[27] http://www.teias.gov.tr/projeksiyon/KapasiteProjeksiyonu2011.doc

Electric efficiency rates

There is no complete and up-to-date data regarding the electrical efficiency of thermal power plants that supply electricity to the Turkish National Grid system. Therefore the default values provided in Annex 1(Default efficiency factors for power plants) of the Methodological Tool to calculate the emission factor for an electricity system (Version 04.0.0) (EB 75; Annex 15) is utilised, in a very conservative manner, considering that we are unable to differentiate the units that were commissioned before year 2000, and we cannot differentiate their technologies, all the coal and lignite fired thermal power plants are considered to operate with 50% efficiency, all the oil fired power plants are considered to operate with 46% efficiency, and all the Natural Gas fired power plants are considered to operate at 60 % efficiency. For the diesel powered thermal power plants the efficiency is considered to be 46%. Since the default values are not provided for Naphtha, it is considered to behave like oil and its efficiency is considered as 46%, and Bitumen is considered to behave like coal and its efficiency is considered to be 50%. The efficiency values considered in BM calculations can be summarized as follows (Table 14):

Table 14: Default Electric efficiency rates taken from Annex 1 of the Methodological Tool to calculate the emission factor for an electricity system (Version 04.0.0) (EB 75 Report Annex 15).

Fuel Type	Average Electric efficiency rate
Coal	50.0%
Lignite	50.0%
Fuel Oil	46.0%
Diesel	46.0%
Naphtha	46.0%
Natural Gas	60.0%
Bitumen	50.0%

The parameters for the calculation of $EF_{EL,m,y}$, and its calculation is shown in Table 15 below:

Table 15: Calculation of EF_{EL} generation efficiency based on the default values provided in Annex 1 of the Methodological Tool to calculate the emission factor for an electricity system (Version 4.0.0) (EB 75 Report Annex 15)

Fuel Type	EF (tCO_2/TJ)	(EF*3.6)	Generation Efficiency %	$EF_{EL,m,y}$ tCO_2/MWh
Coal	92.80	334.080	50.0%	0.668
Lignite	90.90	327.240	50.0%	0.654
Fuel Oil	75.50	271.800	46.0%	0.591
Diesel	72.60	261.360	46.0%	0.568
Naphtha	69.30	249.480	46.0%	0.542
Natural Gas	54.30	195.480	60.0%	0.326
Bitumen	73.00	262.800	50.0%	0.526

The CO_2 emissions from the most recent capacity additions are calculated by multiplying the $EF_{EL,m,y}$ values calculated for each fuel source by the annual generation of that fuel source (Table 16). The emission factor has been taken as “zero” for the renewable and wastes. The Build

Margin Emission Factor for each year is calculated by dividing the total CO_2 Emissions of the subject year by the total generation from the capacity additions of the same year.

Table 16 Annual CO_2 Emissions for Capacity Additions and Annual BM Emission Factors

Capacity Additions in 2010 (GWh)		CO_2 Emissions	$EF_{grid,BM,2010}$
Coal	8,011.76	5,353.14	
Lignite	0.0	0.00	
Natural Gas	8,963.60	2,920.34	
Renewables and Wastes	390.75	0.00	
TOTAL	**17,366.11**	**8,273.48**	**0.47642**
Capacity Additions in 2011 (GWh)		CO_2 Emissions	$EF_{grid,BM,2011}$
Fuel Oil	922.67	545.18	
Coal	4.32	2.89	
Lignite	180.78	98.05	
Naphtha	-	0.00	
Natural Gas	12,301.75	4,007.91	
Renewables and Wastes	2,045.00	0.00	
TOTAL	**15,454.53**	**4,654.02**	**0.30114**
Capacity Additions in 2012 (GWh)		CO_2 Emissions	$EF_{grid,BM,2012}$
Fuel Oil	48	28.36	
Coal	202	134.97	
Lignite	145.00	94.90	
Naphtha	-	0.00	
Natural Gas	9,192.53	2,994.93	
Renewables and Wastes	4,199.92	0.00	
TOTAL	**13,787.45**	**3,253.16**	**0.23595**

The Build Margin Emission Factor of the grid is then calculated as a generation weighted average for the years 2010,2011 and 2012. The resulting BM Grid is:

$EF_{grid,BM}$ = 0.34716 tCO_{2e}/MWh

Combined margin emission factor

Where weights w_{OM} and w_{BM} are by default 0.50 and 0.50 according to the selected methodology. And EF_{OM} and EF_{BM} are calculated as described in the previous steps.

Based on the formula above, baseline emission factor is calculated as;

EF_y = 0.50 * 0.68084 tCO_{2e}/MWh + 0.50 * 0.34716 tCO_{2e}/MWh = 0.5140016 tCO_{2e}/MWh

Emission reductions

$ER_y = BEy = EG_{facility,y} * EFy$

= 124,050 MWh* 0.5140016 tCO_{2e}/MWh = 63,761 tCO_{2e} for each year.

A summary of the GHG removals by the project activity is given as follows (Table 17):

Table 17: summary of the GHG removals by the project activity

Years	Estimated baseline emissions or removals (tCO_{2e})	Estimated project emissions or removals (tCO_{2e})	Estimated leakage emissions (tCO_{2e})	Estimated net GHG emission reductions or removals (tCO_{2e})
Year 0: 2012 (27 Dec to 31 Dec.)	873	0	0	873
Year 1: 2013	63,761	0	0	63,761
Year 2: 2014	63,761	0	0	63,761
Year 3: 2015	63,761	0	0	63,761
Year 4: 2016	63,761	0	0	63,761
Year 5: 2017	63,761	0	0	63,761
Year 6: 2018	63,761	0	0	63,761
Year 7: 2019	63,761	0	0	63,761
Year 8: 2020	63,761	0	0	63,761
Year 9: 2021	63,761	0	0	63,761
Year 10: 2022 (Jan. 1st to Dec 26)	62,888	0	0	62,888
Total	637,610	0	0	637,610

4 MONITORING

4.1 Data and Parameters Available at Validation

The following are the data and parameters available at validation:

Data / Parameter	$FC_{i,y}$
Data unit	Volume Unit (cubic meter)
Description	Amount of fuel *i* consumed by relevant power plants in Turkey in years, 2010, 2011, 2012.
Source of data	Official publications at the Turkish Electricity Transmission Company (TEIAŞ) Web Site (http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/yakıt48-53/49.xls)
Value applied:	-
Justification of choice of data or description of measurement methods and procedures applied	Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation
Purpose of Data	Please see Annex 2-Table-1
Comments	-
	Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The data published on the TEİAŞ website is the most up-to date and reliable data available for the Turkish grid.
	Data used for the calculation of $EF_{grid,OM,Simple,y}$

Data / Parameter:	$NCV_{i,y}$
Data unit:	GJ/Mass or Volume Unit
Description:	Net Calorific Values for fossil fuel type *i* in year, for the years 2010, 2011 and 2012
Source of data:	Regional or national average default values that are reliable and documented in national energy statistics of the Turkish Electricity Transmission Company Web Site (http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/ yakıt48-53/49.xls http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/ yakıt48-53/51.xls)
Measurement procedures (if any):	-
Monitoring frequency:	For Simple OM : Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation For BM: For the first crediting period, once for the *ex ante* and for the second and third crediting period, only once *ex ante* at the start of the second crediting period
Value applied:	Please see Annex-2-Table-5

QA/QC Procedures	-
Justification of choice of data or description of measurement methods and procedures applied:	Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The data published on the TEİAŞ website is the most up-to date and reliable data available for the Turkish grid.
Any comment:	Data used for the calculation of $EF_{grid,OM,Simple,y}$. As data on the NCV is not published directly on the TEİAŞ website, this data is calculated using the heating values of fuels and the volume or mass of fuels consumed for each year.

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of fossil fuel type *i* in year *y*
Source of data:	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Measurement procedures (if any):	-
Monitoring frequency:	For Simple OM : Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation For BM: For the first crediting period, once for the *ex ante* and for the second and third crediting period, only once *ex ante* at the start of the second crediting period
QA/QC Procedures	-
Value applied:	Please see Annex 2-Table-2.
Justification of choice of data or description of measurement methods and procedures applied:	According to the "Tool to calculate the emission factor for an electricity system" version 04.0.0 , if values provided by the fuel supplier of the power plants in invoices or regional or national average defaults values are not available the IPCC default values at the lower limit of uncertainty must be used.
Any comment:	Data used both for the calculation of $EF_{grid,OM,Simple,y}$ and $EF_{EL,m,y}$

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net electricity generated in the project electricity system in other words, net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year y
Source of data:	Turkish Electricity Transmission Company Web Site http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/uretim%20tuketim(23-47)/34(84-12).xls
Measurement procedures (if any):	-
Monitoring frequency:	For Simple OM : Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation For BM: For the first crediting period, once for the *ex ante* and for the second and third crediting period, only once *ex ante* at the start of the second crediting period
QA/QC Procedures	-
Value applied:	Please see Annex 2-Table 3 and Table 4.
Justification of choice of data or description of	Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The data published on

measurement methods and procedures applied:	the TEİAŞ website is the most up-to-date and reliable data available for the Turkish grid.
Any comment:	Data used for the calculation of $EF_{grid,OM,Simple,y}$

Data / Parameter:	$EG_{m,y}$
Data unit:	MWh
Description:	Net electricity generated and delivered to the grid by power unit m in year y
Source of data:	Turkish Electricity Transmission Company Web Site (www.teias.gov.tr). Data is extracted from the relevant annexes of the capacity projection reports for the years 2010[28], 2011[29] and 2012[30].
Measurement procedures (if any):	-
Monitoring frequency:	For Simple OM : Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation For BM: For the first crediting period, once for the *ex ante* and for the second and third crediting period, only once *ex ante* at the start of the second crediting period
QA/QC Procedures	-
Value applied:	Please see Annex 2-Table 8.
Justification of choice of data or description of measurement methods and procedures applied:	Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The data published on the TEİAŞ website is the most up-to-date and reliable data available for the Turkish grid.
Any comment:	Data used for the calculation of $EF_{grid,BM,y}$

Data / Parameter:	$\eta_{m,y}$
Data unit:	-
Description:	Average net energy conversion efficiency of power unit m in year y
Source of data:	The default values provided at the Annex 1 of the "Tool to calculate emission factor for an electricity sector (Version 04.0.0)" are used
Measurement procedures (if any):	
Monitoring frequency:	Once for the crediting period
QA/QC Procedures	N/A as the default values provided in Annex 1 are used.
Value applied:	Please see Annex 1 of the "Tool to calculate emission factor for an electricity sector (Version 04.0.0)"
Justification of choice of data or description of measurement methods and procedures applied:	According to the "tool to calculate emission factor for an electricity system if documented manufacturer's specifications or data from the utility, the dispatch centre or official records are not available then the default values given in Annex 1 of the tool shall be used. The first two options are not available for the power plants supplying the Turkish grid, therefore the default values are used.
Any comment:	Data used for the calculation of EFgrid,BM,y

[28] http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf
[29] http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2011.pdf
[30] http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2012.pdf

4.2 Data and Parameters Monitored

The following are the data that will be available during the monitoring.

Data / Parameter:	$EG_{PP\text{-}Gross\ Generation,\ y}$
Data unit:	MWh
Description:	Quantity of electricity exported by the power plant to the Grid for self consumption, in year y
Measured /Calculated /Default:	Measured
Source of data:	The Primary source of data will be the TEIAS meter readings recorded remotely and accessible via the PMUM/MFRC web site[31]. These meters are located at the Yenidere Transformer Station of TEIAŞ. The secondary source of data will be the bi-directional meter located at the Midilli HPP Powerhouse.
Description of measurement methods and procedures to be applied:	Measurements are to be made by electricity meters that belong to the grid operator, TEIAŞ. There are two meters that record the electricity coming over two different lines identified as Midilli 1 and Midilli 2. The internal consumption data is the sum of the amount of electricity recorded to be imported from the grid by these two main meters. The meters are be in compliance with the collected data. Data will be used to calculate the net electricity supplied to the grid. The meter readings are accessible via an Automatic Meter Reading Software remotely by the project owner, via a software, and data is automatically recorded to the PMUM/MFRC servers to be obtained as monthly screen outputs. Only the main meter readings are accessible but there are back up meters to ensure data recording in case of main meter failure.
Frequency of monitoring/recording:	Recorded continuously, read remotely by TEIAS, and accessible monthly via the PMUM/MFRC web site , Reported annually on the Monitoring Report.
Value applied:	Will be determined at the monitoring stage
Monitoring equipment:	Main Electricity Meter-1 : “ANA SAYAÇ” ELSTER A 1500 Serial Number: 464220 Main Electricity Meter-2: ANA SAYAÇ” ELSTER A 1500 Serial Number: 464222 Back-up Electricity “YEDEK SAYAÇ”-1: ELSTER A 1500 Serial Number: 464221 (data is only obtained if there is a failure in the main meter-1, the readings are not recorded or kept otherwise) Back-up Electricity “YEDEK SAYAÇ”-2: ELSTER A 1500 Serial Number: 464223 (data is only obtained if there is a failure in the main meter-1, the readings are not recorded or kept otherwise) Control Meter at Power House : ELSTER A 1500 Serial Number: 00436796 Back up of the Control Meter at Power House : ELSTER A 1500 Serial Number: 00436795 (data is only obtained if there is a failure in the main meter-1, the readings are not recorded or kept otherwise) All meters are in compliance with the communiqué for Metering Devices to be used in the Electricity Market[32]. They have an accuracy class of Class 0,5S indicating an accuracy range of ±0.5%.
QA/QC procedures to be applied:	Measurements will be carried out in compliance with the communiqué for Metering Devices to be used in the Electricity Market. The minimum accuracy of the meters are Class0,5S, that is to say should be within the

[31] PMUM/MFRC Piyasa Mali Uzlaştırma Merkezi / Market Financial Reconciliation Center.
[32] The latest version of the communiqué (in Turkish) can be found in the following link: http://www.epdk.gov.tr/web/elektrik-piyasasi-dairesi/44

	±0.5% (±0.005) range. The monthly reported meter readings by the main meters, will be cross-checked against the Main control meter with the serial number 00436796 located at the Midilli HPP Power house.
Calculation method:	Direct continuous measurement
Any comment:	Data will be used to calculate net electricity supplied to the grid.

Data / Parameter:	$EG_{PP\text{-self consumption, y}}$
Data unit:	MWh
Description:	Quantity of electricity imported by the power plant from the Grid for self consumption, in year y
Measured /Calculated /Default:	Measured
Source of data:	The Primary source of data will be the TEIAS meter readings recorded remotely and accessible via the PMUM/MFRC web site[33]. These meters are located at the Yenidere Transformer Station of TEIAŞ. The secondary source of data will be the bi-directional meters located at the Midilli HPP Powerhouse.
Description of measurement methods and procedures to be applied:	Measurements are to be made by electricity meters that belong to the grid operator, TEIAŞ. There are two meters that record the electricity coming over two different lines identified as Midilli 1 and Midilli 2. The internal consumption data is the sum of the amount of electricity recorded to be imported from the grid by these two main meters. The meters are be in compliance with the collected data. Data will be used to calculate the net electricity supplied to the grid. The meter readings are accessible via an Automatic Meter Reading Software remotely by the project owner, via a software, and data is automatically recorded to the PMUM/MFRC servers to be obtained as monthly screen outputs. Only the main meter readings are accessible but there are back up meters to ensure data recording in case of main meter failure.
Frequency of monitoring/recording:	Recorded continuously, read remotely by TEIAS, and accessible monthly via the PMUM/MFRC web site , Reported annually on the Monitoring Report.
Value applied:	Will be determined at the monitoring stage
Monitoring equipment:	Main Electricity Meter-1 : “ANA SAYAÇ” ELSTER A 1500 Serial Number: 464220 Main Electricity Meter-2: ANA SAYAÇ” ELSTER A 1500 Serial Number: 464222 Back-up Electricity “YEDEK SAYAÇ”-1: ELSTER A 1500 Serial Number: 464221 (data is only obtained if there is a failure in the main meter-1, the readings are not recorded or kept otherwise) Back-up Electricity “YEDEK SAYAÇ”-2: ELSTER A 1500 Serial Number: 464223 (data is only obtained if there is a failure in the main meter-1, the readings are not recorded or kept otherwise) Control Meter at Power House : ELSTER A 1500 Serial Number: 00436796 Back up of the Control Meter at Power House : ELSTER A 1500 Serial Number: 00436795 (data is only obtained if there is a failure in the main meter-1, the readings are not recorded or kept otherwise) All meters are in compliance with the communiqué for Metering Devices to be used in the Electricity Market[34]. They have an accuracy class of Class 0,5S indicating an accuracy range of ±0.5%.

[33] PMUM/MFRC Piyasa Mali Uzlaştırma Merkezi / Market Financial Reconciliation Center.

QA/QC procedures to be applied:	Measurements will be carried out in compliance with the communiqué for Metering Devices to be used in the Electricity Market. The minimum accuracy of the meters are Class0,5S, that is to say should be within the ±0.5% (±0.005) range. The monthly reported meter readings by the main meters, will be cross-checked against the Main control meter with the serial number 00436796 located at the Midilli HPP Power house.
Calculation method:	Direct continuous measurement
Any comment:	Data will be used to calculate net electricity supplied to the grid.

Data / Parameter:	Cap_{PJ}
Data unit:	W
Description:	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data:	Project site
Measurement procedures (if any):	Determined via the turbine plates
Monitoring frequency:	Yearly
QA/QC procedures:	-
Any comment:	-

4.3 Monitoring Plan

Objectives of the monitoring program

The Monitoring plan is developed to ensure that the Project Activity is well organized from the start in terms of the collection and archiving of complete and reliable data that is needed to ensure reliable and accurate measurements of actual emission reductions.

Data to be monitored

Given that the emission factor is calculated on an ex-ante basis, the first data to be monitored is the electricity net supplied to the grid.

The second data to be monitored is the installed capacity of the Project Activity. Using the SCADA system installed capacity will be measured automatically.

Monitoring procedures

The monitoring will be conducted by the Verified Emission Reduction (VER) Monitoring Team. The VER Team Members, and their position and duties for the monitoring is outlined in the following table (Table 18):

Table 18: Positions and responsibilities of the VER monitoring team members.

Position	Responsibility
Midilli HPP Manager	Day to day operation of the Midilli HPP,

[34] The latest version of the communiqué (in Turkish) can be found in the following link: http://www.epdk.gov.tr/web/elektrik-piyasasi-dairesi/44

	Compliance of the project activity with the host country rules and regulations Coordination of the data collection and recording for the monitoring report.
Chief Electrical Technician	Day to day follow up of electrical equipment Recording and monitoring of the electricity generation data via the meters located at the Midilli Powerhouse. Making regular checks of the consistency of the back up meters to ensure the operation of the main meters.
Accounts Manager	Data keeping for power sales Extracting the main meter readings from the PMUM/MFRC website with the help of the account credentials assigned to the project owner.
Chief Mechanical Technician	Day to day operation of the power plant Keeping records of malfunctions and repairs
Carbon Consultant	Emission reduction calculations Scripting of the periodic monitoring report Follow up of the verification process

The power imported from the grid and exported to the grid is recorded continously via two bidirectional meters located at Yenidere Transformation Station that belongs to the Grid operator TEIAŞ.

The total electricity import and the total electricity export of the project activity is measured via two meters that measure the generation over two feeders that carry electricity from the power house to the Yenidere Transformation station via a short cable. The data is measured continously and recorded on an hourly basis to the PMUM/MFRC servers.

Data can be accessed remotely via the Automated Meter Reading Software installed to the project owners computers, but is continously recorded to the PMUM/MFRC servers.

Each month the internal and external consumption recorded hourly by the meters are extracted and saved onto excel spread sheets, for each meter..

Data used for the calculation of $EG_{PP\text{-}self\ consumption,\ y}$ $EG_{PP\text{-}gross,\ y}$ parameters are the summation of the outputs provided via two meters, Midilli Ana-1 and Midilli Ana-2. The PMUM/MFRC servers automatically calculate the overall grid loss of the country and reflect it in the monthly meter reading outputs of each meter, along side with the direct meter readings. The amount indicated with loss are not used in the emission reduction calculations as the loss calculated by the grid operator is beyond the project boundary.

Monitoring equipment

Electricity meters

The main and back-up electricity meter will be bi-directional for quantifying the electricity delivered by the Project Activity to the grid.

The meters will be in compliance with the standards of the Turkish Standards Institute and will have obtained a "Type and System Approval" certificate from the Ministry of Trade and Industry. In case there are modifications to the standards, the modified standard shall be valid; and in case a valid standard is cancelled or abolished, the new standard shall be valid. The standards that will be used are TS-620 EN 60044-1 and TS718 IEC60044.2 for main and back-up meters, respectively. The sensitivity of the main and secondary meters are CI = 0.5S for active and reactive energy. The meters shall be factory calibrated by the manufacturer before installation. Records of the meter (type, made, model and calibration documentation) will be retained in the quality control system.

Data collecting and recording

I. The net electricity generation by the project activity. Based on the baseline scenario presented above, this amount of electricity would have been produced by the Turkish National Grid.

The electricity produced will be sold to TEİAŞ. Therefore, TEİAŞ measures the electricity produced as the summation of two main meters and two Back-up meters:

Meters:

a. Main Electricity Meter-1: ELSTER A1500 SL761: -Serial Number: 464220
b. Main Electricity Meter-2: ELSTER A1500 SL761: -Serial Number: 464222
c. Back-up Electricity Meter-2: ELSTER A1500 SL761: -Serial Number: 464221
d. Back-up Electricity Meter-2: ELSTER A1500 SL761: -Serial Number: 464223

These meters are placed at the TEIAŞ Yenidere TM (Transformer Station). The Summation of the data recorded by the Main meter 1 and 2 will provide official data which will be remotely read remotely and recorded continously to the PMUM/MFRC serves for invoicing. TEİAŞ also conducts the calibration and maintenance of these meters and thus, ensures the accuracy and quality of the measurements. The quality standards that the meters need to comply is "The ICE/TSE 62053-22: Electricity metering equipment (a.c) – Particular requirements - Part 22: Static meters for active energy (Classes 0,2 S and 0,5 S)" The calibration of the meters are done and the meters will be checked continuously if there is a difference of ±0.5 % in the readings of the main and the back-up meters, the calibration is repeated.

At the end of each month, the monthly generation will be accessed remotely via the PMUM/MFRC web site by the Project owners account manager to determine the invoiced generation amount. In case of failure of any of the main meters, their relevant control meters are used to determine the invoiced generation amount.

The net electricity produced ($EG_{PP\text{-}net,\ y}$) in year y is calculated by subtracting the total electricity consumed by the hydroelectric power plant ($EG_{PP\text{-}self\ consumption,\ y}$) , from the gross electricity generation ($EG_{PP\text{-}gross,\ y}$) . After obtaining the net electricity production value, the emission reductions will be calculated by multiplying the net electricity with the Ex-ante Combined Margin Emission Factor calculated above.

Measuring Installed Capacity

By means of the SCADA system established in the plant all kinds of technical parameters related with turbines and generators including installed capacity will be measured and stored in the system on real time basis. The installed capacity of the plant will be measured from SCADA once a year while the plant is operated with full load and the related data will be stored as per the monitoring program.

Data management

At the end of each month, electricity supplied to the grid will be transferred into an electronic spread sheet titled raw data, so that it can be processed for verified emission reduction calculations. The data to be measured for installed capacity will be entered into an electronic spread sheet at the end of each year. The electronic files will be backed up on both hard drives and on a Compact Discs (CD).

Quality Control and Assurance (QC/QA)

All of the main and back-up meters located at Yenidere TM (Transformation Station) are owned and installed by the grid operator, TEIAS. The Project Owner has signed an agreement with the grid operator to specify the QA procedure for measurement and calibration to ensure the measurement accuracy of the main and back-up meters are in compliance with national regulations. The Calibrations of the electricity meters are valid for the next 10 years after calibration,

The grid operator's Metering Officer should be notified of any failure of one of the meters. TEIAS is the only one entity, authorized to deal with fixing, calibrating, or changing the meters, which will be done either by the grid operator or by a company authorized by the grid operator. The Project Owner will keep electricity export and import records via the meters that are located at the powerhouse, to which the recorded data will be compared.

All written documentation such as maps, drawings, the EIA and the Feasibility study, will be stored and will be made available to the verifier so that the reliability of the information may be checked.

All the data and documentation related to the verification will be archived for minimum two years after the end of the first crediting period.

5 ENVIRONMENTAL IMPACT

In accordance with “Environmental Law” No. 2872 (Issued in 1983), Annex 2 of Environmental Impact Assessment (EIA) Regulation (issued in 1993 and revised in 2001), run-of-river type HPPs with an installed capacity of 50 MW or less are not subject to full EIA investigation or report preparation. Instead, for these types of projects, a preliminary EIA report including general information about the project site and general project characteristics was submitted to local Branch of The Ministry of Environment and Forestry (Later the tittle of the ministry changed as Ministry of Environment and Urban Planning). At the end of the review of the report, the Ministry issued a certificate stating that “there is no need for an EIA report”.

Some possible environmental impacts during construction and operating phases stated in the preliminary EIA are summarized in the following:

Air quality

Models of dust flow and emissions from the project activity in relation to the nearest residential areas revealed no significant effects and values were well within the regulation standards. The provisions of “Regulations for Control of Air Pollution Caused by Industrial Facilities", announced in the Official Gazette No. 26236, dated 22/07/2006, will be observed during construction.

Noise

Modelling the noise level of the site predicted that both day and night time noise levels around the nearest residential areas will be within the standards of the “Day and night noise limits for Rural Areas and Settlement Areas" in accordance with the Article 25 of the Regulations for Evaluation and Management of Environmental Noise announced in the Official Gazette No. 25862 on 01.07.2005.

Water quality

The project activity is not expected to have any effect on water quality. No pollution from any source will be emitted into the river from the operation of the plant. Hazardous Material and Waste Obtaining, handling and transportation of the benzene and oil that will be used during construction will be done in accordance with the "Control of Hazardous Waste Directives" which were published in the Official Gazette number 25755 on March 14th 2005 and the "Control of Oil Wastes Directives" which were published in the Official Gazette number 25353 on January 21st 2004. All activities related to fuels and oils will be done in a drained area to prevent leakage, and the drained excess fuels and oils will be transferred to waste treatment facilities.

Other hazardous waste materials such as used tires, used batteries, cables, paint, barrels, oil contaminated soil, oil preserving filters, etc., will be piled in a designated are on site temporarily in accordance with Control of Hazardous Waste Directive which was published in the Official Gazette dated March 14th, 2005 and numbered 25755 and will ultimately be transported to the nearest hazardous waste recycling or discharge plants.

As there was no settlement in the reservoir area, resettlement was not needed for the Project Activity.

6 STAKEHOLDER COMMENTS

Since the project activity was less than 50 MW, the host country regulations didn't request the project activity to perform a full EIA. Therefore there was not a stake holder consultation meeting held within the framework of an SEIA. However, in order to explain the issues related to the project and especially in order to inform the land owners about the expropriation process the Energy Market Regulatory Agency have organized a stake holder's consultation meeting.

When we have visited the site to collect information for the Social Carbon Standard Point Zero Report, we have contacted the village heads (muhtars) of the nearby settlements and we have talked with the local government officers who are in charge of the issues like environmental monitoring.

To be able to confirm the occurrence of the mentioned EMRA organized, expropriation related stake holder consultation meeting, we asked about this to the Muhtar's. Mr Muharrem Kelce, the Muhtar of the Kızılkışlacık village, explained us that there really occurred one such meeting to explain the project's aspects and the expropriation process that would effect their lands.

In our visits to the local representation of the Ministry of the Environment and Urban Planning we asked about any possible environmental disturbance the project activity could have cause, during construction and operation stages of the project. It is revealed in our conversations that during the construction period there were some issues related to dusting, but this problem is not existing at the time of this version of the PDD as the project activity is now operational.

More information about the acceptance of the project and relationship between the project management and local stakeholders can be found in the Point Zero Social Carbon Report prepared for the project activity.

In general we have observed that there has been some issues raised by the stakeholders during the construction phase of the project, and local inhabitants attributed these issues mainly to the attitudes former owners of the project activity. The government official were happy with the project as the project was in compliance with the host country regulations (See Annex 1).

Both the muhtars that we have interviewed about the project activity and the local government offices also noted that the communication between the Midilli HPP management and the local inhabitants were based on an ad hoc relationship, where the local inhabitants were always welcome to visit, and that they were able to reach the project activity management via cell phone, any time they needed.

ANNEX-1: THE LEGAL FRAMEWORK OF THE HOST COUNTRY THAT BINDS THE PROJECT ACTIVITY

Turkish Environmental Legislation

The Environmental Law (No. 2872), which was published in Turkish Official Gazette No. 18132 dated August 11, 1983 and revised in Turkish Official Gazette No. 26167 dated May 13, 2006 (Law No. 5491) provides the legislative framework for the regulation of industries and their potential impact on the environment. Industrial projects are subject to varying levels of review that begin while projects are in the development and pre-operation phases. Additional regulations apply to facilities once they are in operation.

The Environmental Law authorized the promulgation of a number of regulations. Those that pertain to development and operation of renewable energy projects are the following:

- Environmental Impact Assessment Regulation, Official Gazette No. 26939 dated July 17, 2008.
- Water Pollution Control Regulation, Official Gazette No. 25687 dated December 31, 2004 and revised in Official Gazette No. 26786 dated February 13, 2008;
- Regulation on Construction of Cesspits where there is no Wastewater Collection System, Official Gazette No. 13783 dated March 13, 1971;
- Hazardous Chemicals Regulation, Official Gazette No.21634 dated July 11, 1993 and revised in Official Gazette No. 27092 dated December 26, 2008;
- Regulation on General Principles of Waste Management, Official Gazette No. 26927 dated July 5, 2008;
- Hazardous Wastes Control Regulation, Official Gazette No. 25755 dated March 14, 2005;
- Waste Oil Control Regulation, Official Gazette No. 26952 dated July 30, 2008 and revised Official Gazette No. 27304 dated July 31, 2009;
- Vegetative Waste Oil Control Regulation, Official Gazette No. 25791 dated April 19, 2005; and revised Official Gazette No. 27305 dated July 31, 2009
- Solid Waste Control Regulation, Official Gazette No. 20814 dated March 14, 1991 and revised in Official Gazette No. 25777 dated April 5, 2005;
- Medical Waste Control Regulation, Official Gazette No. 25883 dated July 22, 2005;
- Environmental Audit Regulation, Official Gazette No. 27061 dated November 21, 2008;
- Packaging Waste Control Regulation, Official Gazette No. 26562 dated June 24, 2007 and revised in Official Gazette No. 27046 dated November 6, 2008; and
- Waste Batteries and Accumulators Control Regulation, Official Gazette No. 25569 dated August 31, 2004 and revised in Official Gazette No. 25744 dated March 03, 2005;
- The Excavation, Construction and Demolition Waste Control Regulation, Official Gazette No. 25406 dated March 18, 2004;
- Soil Pollution Control Regulation, Official Gazette No. 25831 dated May 31, 2005;
- Regulation Related to Workplace Opening and Operation Permits, Official Gazette No. 25902 dated August 10, 2005 and revised in Official Gazette No. 26492 dated April 13, 2007;
- Industrial Air Pollution Control Regulation, Official Gazette No.27277 dated July 3, 2009
- Air Quality Assessment and Management Regulation, Official Gazette No. 26898 dated June 6, 2008 and revised in Official Gazette No. 27219 and dated May 5, 2009;

- Air Pollution Control Regulation For Heating Sources, Official Gazette No. 25699 dated January 13, 2005 and revised in Official Gazette No. 27134 dated February 07, 2009;
- Exhaust Gases Emission Control Regulation, Official Gazette No. 27190 dated April 04, 2009; and
- Regulation on Protection of Wetlands, Official Gazette No. 25818 dated May 17, 2005.
- In addition to the Environmental Law and its associated regulations, there are several other laws that directly or indirectly include environmental review, and thus, are applicable to the proposed project. The project will comply with the 4857 numbered Labour Law and its regulations stated below:
- Occupational Health and Safety Statute, Official Gazette No. 14765 dated April 11, 1974;
- Health and Safety Regulation for Construction Works, Official Gazette No. 25325 dated December 23, 2003;
- Regulation on Health and Safety Regarding Temporary Works, Official Gazette No. 25463 dated May 15, 2004.

Other regulations that the project will comply with can be listed as follows:

- 5346 numbered Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy;
- Regulation on Protection and Usage of Agricultural Lands, Official Gazette No. 25766 dated March 25, 2005;
- 2863 numbered Law on Protection of Cultural and Natural Heritage (revised by 5226 numbered Law);
- 4342 numbered Pasture Law;
- 6831 numbered Forestry Law (amended by 5192 numbered Revision in Forestry Law);
- Regulation on Buildings located on the Disaster Areas, Official Gazette No. 26582 dated July 14, 2007;.

ANNEX-2: BASELINE INFORMATION

Table 1: http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/yakıt48-53/49.xls

http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/yakıt48-53/49.xls

TÜRKİYE TERMİK SANTRALLARINDA TÜKETİLEN YAKIT MİKTARLARININ ÜRETİCİ KURULUŞLARA DAĞILIMININ YILLAR İTİBARİYLE GELİŞİMİ

(BİRLEŞİK ISI-ELEKTRİK SANTRALLARINDA ISI ÜRETİMİ İÇİN KULLANILAN YAKITLAR DAHİL)

ANNUAL DEVELOPMENT OF FUELS CONSUMED IN THERMAL POWER PLANTS IN TURKEY BY THE ELECTRIC UTILITIES

(FUELS USED FOR HEAT PRODUCTION IN CHP PLANTS INCLUDED)

Birim(Unit):Ton/Gaz(gas) 10^3 m^3

			2010	2011	2012
EÜAŞ VE BAĞLI ORTAKLIKLARI *EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ*	**Taşkömürü**	*Hard Coal*	1,563,792	1,700,458	1,254,622
	Linyit	*Lignite*	50,123,941	54,558,282	48,859,540
	TOPLAM	*TOTAL*	**51,687,733**	**56,258,740**	**50,114,162**
	Fuel-Oil *Fuel Oil*	**Asıl Yakıt** *Main Fuel*	16,864	27,098	28,127
		Yrd. Yakıt *Auxiliary Fuel*	105,073	118,439	139,239
		TOPLAM *TOTAL*	**121,937**	**145,537**	**167,366**
	Motorin *Diesel Oil*	**Asıl Yakıt** *Main Fuel*	4	0	0
		Yrd. Yakıt *Auxiliary Fuel*	18,901	13,984	60,370
		TOPLAM *TOTAL*	**18,905**	**13,984**	**60,370**
	TOPLAM	*TOTAL*	**140,842**	**159,521**	**227,736**
	Doğal Gaz	*Natural Gas*	4,493,275	4,173,420	4,427,602
MOBİL SANTRALLAR *MOBILE POWER PLANTS*	**Fuel-Oil**	*Fuel Oil*	0	0	0
	Motorin	*Diesel Oil*	0	0	0
	TOPLAM	*TOTAL*	**0**	**0**	**0**
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ* *AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ*	**Taşkömür+İthal kömür**	*Hard Coal+Imported Coal*	5,855,911	8,873,976	11,003,840
	Linyit	*Lignite*	6,565,451	6,949,028	6,882,923
	TOPLAM	*TOTAL*	**12,421,362**	**15,823,004**	**17,886,763**
	Fuel-Oil	*Fuel Oil*	769,845	386,071	397,430
	Motorin	*Diesel Oil*	1,449	1,063	116,009
	LPG	*LPG*	0	0	0
	Nafta	*Naphta*	13,140	0	0
	TOPLAM	*TOTAL*	**784,434**	**387,134**	**513,439**
	Doğal Gaz	*Natural Gas*	17,290,139	18,631,167	18,662,519
TÜRKİYE *TURKEY*	**Taşkömür+İthal kömür**	*Hard Coal+Imported Coal*	7,419,703	10,574,434	12,258,462
	Linyit	*Lignite*	56,689,392	61,507,310	55,742,463
	TOPLAM	*TOTAL*	**64,109,095**	**72,081,744**	**68,000,925**
	Fuel-Oil	*Fuel Oil*	891,782	531,608	564,796
	Motorin	*Diesel Oil*	20,354	15,047	176,379
	LPG	*LPG*	0	0	0
	Nafta	*Naphta*	13,140	0	0
	TOPLAM	*TOTAL*	**925,276**	**546,655**	**741,175**
	Doğal Gaz	*Natural Gas*	**21,783,414**	**22,804,587**	**23,090,121**

Not:Ayrıca Otoprodüktör santrallarda kullanılan Ağaç Kabuğu, Talaş ,Sıvı Kükürt, Siyah Likör, Katran, Kükürt keki , Kok Gazı, YF Gazı Rafineri gazı,Biogaz ve Endüstriyel atık ile ilgili miktarlar tabloda yer almamaktadır.

Note: Quantities of Wood Wastes, Liquid Sulphur, Black Liquor, Bitumen Pyrite,Sulphur Cake etc. and Natural Gas,Coke Oven Gas , Blast Furnace Gas and Refinery Gas values used by autoproducers are not included in the table.

* ADÜAŞ'ın lisansı Eylül 2008 tarihinde serbest üretim lisansına dönüştürülmüştür.

ADÜAŞ's license has been turned into the IPP license in September 2008

Table-2: IPCC Default CO_2 Emission Factors

Fuel Type:	EF (tCO2/TJ)	Fuel Type:	EF (tCO2/TJ)
Coal	92.80	LPG	61.60
Lignite	90.90	Naphtha	69.30
Fuel Oil	75.50	Natural Gas	54.30
Diesel	72.60	Bitumen	73.00

Table 3:
Source: http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/yakıt48-53/51.xls

TÜRKİYE TERMİK SANTRALLARINDA TÜKETİLEN YAKITLARIN KURULUŞLARA GÖRE ISI DEĞERLERİ
(BİRLEŞİK ISI-ELEKTRİK SANTRALLARINDA ISI ÜRETİMİ İÇİN KULLANILAN YAKITLAR DAHİL)
HEATING VALUES OF FUELS CONSUMED IN THERMAL POWER PLANTS IN TURKEY BY THE ELECTRIC UTILITIES
(FUELS USED FOR HEAT PRODUCTION IN CHP PLANTS INCLUDED)

Birim(Unit): Tcal

			2010	2011	2012
EÜAŞ VE BAĞLI ORTAKLIKLARI *EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ*	**Taşkömürü**	*Hard Coal*	4,990	5,511	4,062
	Linyit	*Lignite*	80,967	91,352	78,369
	TOPLAM	*Total*	**85,957**	**96,863**	**82,431**
	Fuel-Oil *Fuel Oil*	**Asıl Yakıt** *Main Fuel*	162	261	269
		Yrd. Yakıt *Auxiliary Fuel*	1,009	1,137	1,337
		TOPLAM *TOTAL*	**1,171**	**1,398**	**1,605**
	Motorin *Diesel Oil*	**Asıl Yakıt** *Main Fuel*	0	0	0
		Yrd. Yakıt *Auxiliary Fuel*	195	144	622
		TOPLAM *TOTAL*	**195**	**144**	**622**
	TOPLAM	*TOTAL*	**1,366**	**1,542**	**2,227**
	Doğal Gaz	*Natural Gas*	**37,354**	**34,621**	**36,773**
	TOPLAM	*TOTAL*	**124,676**	**133,026**	**121,431**
MOBİL SANTRALLAR *MOBIL POWER PLANTS*	**Fuel-Oil**	***Fuel Oil***	0	0	0
	Motorin	***Diesel Oil***			
	TOPLAM	***TOTAL***	**0**	**0**	**0**
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ *AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ*	**Taşkömür+İthal kömür**	*Hard Coal+Imported Coal*	34,556	52,056	67,208
	Linyit	*Lignite*	15,584	15,857	15,218
	TOPLAM	*Total*	**50,141**	**67,914**	**82,426**
	Fuel-Oil	*Fuel Oil*	7,398	3,882	4,019
	Motorin	*Diesel Oil*	15	11	1,262
	Lpg	*Lpg*	0	0	0
	Nafta	*Naphta*	105	0	0
	TOPLAM	*TOTAL*	**7,518**	**3,893**	**5,281**
	Doğal Gaz	*Natural Gas*	**157,134**	**167,443**	**166,993**
	TOPLAM	*TOTAL*	**207,275**	**235,357**	**249,419**
TÜRKİYE *TURKEY*	**Taşkömür+İthal kömür**	*Hard Coal+Imported Coal*	39,546	57,567	71,270
	Linyit	*Lignite*	96,551	107,210	93,587
	TOPLAM	*Total*	**136,097**	**164,777**	**164,857**
	Fuel-Oil	*Fuel Oil*	8,569	5,280	5,625
	Motorin	*Diesel Oil*	209	155	1,884
	Lpg	*Lpg*	0	0	0
	Nafta	*Naphta*	105	0	0
	TOPLAM	*TOTAL*	**8,884**	**5,435**	**7,508**
	Doğal Gaz	*Natural Gas*	**194,487**	**202,064**	**203,766**
	TOPLAM	*TOTAL*	**339,468**	**372,276**	**376,132**

Not 1 :Ayrıca Ağaç kabuğu,talaş,sıvı kükürt,siyah likör,katran,kok gazı,YF gazı,rafineri gazı v.b otoprodüktör santrallarda kullanılan yakıtların ısı değerleri tabloda yer almamaktadır.
Note 1: Heating values of wood wastes,liquid sulphur,black liquor,bitumen,coke oven gas,blast furnace gas,refinery gas used by autoproducers are not included in the table.

Table 4:
Source: Computation based on Table 3 (in Annex-2) provided above.

TÜRKİYE TERMİK SANTRALLARINDA TÜKETİLEN YAKITLARIN KURULUŞLARA GÖRE ISI DEĞERLERİ
(BİRLEŞİK ISI-ELEKTRİK SANTRALLARINDA ISI ÜRETİMİ İÇİN KULLANILAN YAKITLAR DAHİL)
HEATING VALUES OF FUELS CONSUMED IN THERMAL POWER PLANTS IN TURKEY BY THE ELECTRIC UTILITIES
(FUELS USED FOR HEAT PRODUCTION IN CHP PLANTS INCLUDED)
1cal = 4,1868 Joule

Birim(Unit): Gjoule

			2010	2011	2012
EÜAŞ VE BAĞLI ORTAKLIKLARI *EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ*	**Taşkömürü**	*Hard Coal*	20,892,383	23,074,208	17,008,733
	Linyit	*Lignite*	338,990,622	382,472,805	328,113,617
	TOPLAM	*Total*	**359,883,005**	405,547,013	345,122,349
	Fuel-Oil *Fuel Oil*	**Asıl Yakıt** *Main Fuel*	679,656	1,091,289	1,125,052
		Yrd. Yakıt *Auxiliary Fuel*	4,223,229	4,760,433	5,596,475
		TOPLAM *TOTAL*	**4,902,885**	5,851,723	6,721,526
	Motorin *Diesel Oil*	**Asıl Yakıt** *Main Fuel*	159	0	0
		Yrd. Yakıt *Auxiliary Fuel*	815,082	603,737	2,602,536
		TOPLAM *TOTAL*	**815,241**	603,737	2,602,536
	TOPLAM	*TOTAL*	**5,718,126**	**6,455,459**	**9,324,062**
	Doğal Gaz	*Natural Gas*	**156,392,061**	**144,950,365**	**153,961,954**
	TOPLAM	*TOTAL*	**521,993,192**	**556,952,838**	**508,408,366**
MOBİL SANTRALLAR *MOBIL POWER PLANTS*	**Fuel-Oil**	***Fuel Oil***	0	0	0
	Motorin	***Diesel Oil***	0	0	0
	TOPLAM	***TOTAL***	**0**	**0**	**0**
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ *AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ*	**Taşkömür+İthal kömür**	*Hard Coal+Imported Coal*	144,680,890	217,948,438	281,385,144
	Linyit	*Lignite*	65,249,084	66,392,055	63,714,919
	TOPLAM	*Total*	**209,929,975**	**284,340,493**	**345,100,063**
	Fuel-Oil	*Fuel Oil*	30,974,336	16,254,037	16,828,236
	Motorin	*Diesel Oil*	61,818	45,552	5,283,909
	Lpg	*Lpg*	0	0	0
	Nafta	*Naphta*	440,154	0	0
	TOPLAM	*TOTAL*	**31,476,308**	**16,299,589**	**22,112,145**
	Doğal Gaz	*Natural Gas*	**657,887,178**	**701,051,608**	**699,167,092**
	TOPLAM	*TOTAL*	**867,817,153**	**985,392,101**	**1,044,267,155**
TÜRKİYE *TURKEY*	**Taşkömür+İthal kömür**	*Hard Coal+Imported Coal*	165,573,274	241,022,646	298,393,877
	Linyit	*Lignite*	404,239,706	448,864,860	391,828,536
	TOPLAM	*Total*	**569,812,980**	**689,887,506**	**690,222,413**
	Fuel-Oil	*Fuel Oil*	35,877,221	22,105,760	23,549,762
	Motorin	*Diesel Oil*	877,059	649,289	7,886,445
	Lpg	*Lpg*	0	0	0
	Nafta	*Naphta*	440,154	0	0
	TOPLAM	*TOTAL*	**37,194,434**	**22,755,049**	**31,436,207**
	Doğal Gaz	*Natural Gas*	**814,279,239**	**846,001,974**	**853,129,046**
	TOPLAM	*TOTAL*	**1,421,286,653**	**1,558,644,529**	**1,574,787,666**

Table 5:
Source: Computation based on Table 3 (in Annex-2) provided above.

NET CALORIFIC VALUES OF FUELS CONSUMED IN THE THERMAL POWER PLANTS

Unit: TJ/KT

			2010	2011	2012
EÜAŞ VE BAĞLI ORTAKLIKLARI *EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ*	**Taşkömürü**	*Hard Coal*	13.36	13.57	13.56
	Linyit	*Lignite*	6.76	7.01	6.72
	TOPLAM	*TOTAL*	**6.96**	**7.21**	**6.89**
	Fuel-Oil *Fuel Oil*	**Asıl Yakıt** *Main Fuel*	40.30	40.27	40.00
		Yrd. Yakıt *Auxiliary Fuel*	40.19	40.19	40.19
		TOPLAM *TOTAL*	**40.21**	40.21	40.16
	Motorin *Diesel Oil*	**Asıl Yakıt** *Main Fuel*	1.00	0.00	0.00
		Yrd. Yakıt *Auxiliary Fuel*	43.12	43.17	43.11
		TOPLAM *TOTAL*	**43.12**	43.17	43.11
	TOPLAM	*TOTAL*	**40.60**	**40.47**	**40.94**
	Doğal Gaz	*Natural Gas*	34.81	34.73	34.77
MOBİL SANTRALLAR *MOBILE POWER PLANTS*	**Fuel-Oil**	*Fuel Oil*	0.00	0.00	0.00
	Motorin	*Diesel Oil*	0.00	0.00	0.00
	TOPLAM	*TOTAL*	**0.00**	**0.00**	**0.00**
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ* *AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ*	**Taşkömür+İthal kömür**	*Hard Coal+Imported Coal*	24.71	24.56	25.57
	Linyit	*Lignite*	9.94	9.55	9.26
	TOPLAM	*TOTAL*	**16.90**	**17.97**	**19.29**
	Fuel-Oil	*Fuel Oil*	40.23	42.10	42.34
	Motorin	*Diesel Oil*	42.66	42.85	45.55
	LPG	*LPG*	1.00	0.00	0.00
	Nafta	*Naphta*	33.50	0.00	0.00
	TOPLAM	*TOTAL*	**40.13**	**42.10**	**43.07**
	Doğal Gaz	*Natural Gas*	38.05	37.63	37.46
TÜRKİYE *TURKEY*	**Taşkömür+İthal kömür**	*Hard Coal+Imported Coal*	22.32	22.79	24.34
	Linyit	*Lignite*	7.13	7.30	7.03
	TOPLAM	*TOTAL*	**8.89**	**9.57**	**10.15**
	Fuel-Oil	*Fuel Oil*	40.23	41.58	41.70
	Motorin	*Diesel Oil*	43.09	43.15	44.71
	LPG	*LPG*	0.00	0.00	0.00
	Nafta	*Naphta*	33.50	0.00	0.00
	TOPLAM	*TOTAL*	**40.20**	**41.63**	**42.41**
	Doğal Gaz	*Natural Gas*	37.38	37.10	36.95

Table 6: Source: http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/uretim%20tuketim(23-47)/42(06-12).xls

TÜRKİYE BRÜT ELEKTRİK ENERJİSİ ÜRETİMİNİN ÜRETİCİ KURULUŞLAR VE BİRİNCİL ENERJİ KAYNAKLARINA DAĞILIMI
TURKEY'S GROSS ELECTRICITY GENERATION BY PRIMARY ENERGY RESOURCES AND THE ELECTRIC UTILITIES

Birim(Unit) : GWh

ÜRETİM KARAKTERİSTİĞİ *Generation Characteristics*			2009	2010	2011	2012
E	TAŞKÖMÜRÜ	*Hard Coal*	1,851.1	1,882.7	2,004.2	1,479.1
	LİNYİT	*Lignite*	22,395.3	20,646.7	20,588.7	16,173.1
	KÖMÜR TOPLAMI	*Coal Total*	**24,246.4**	**22,529.4**	**22,592.9**	**17,652.2**
Ü	FUEL-OİL	*Fuel Oil*	974.4	62.2	103.0	105.2
	MOTORİN	*Diesel oil*	0.2	0.0	0.0	0.0
A	SIVI TOPLAMI	*Liquid Total*	**974.6**	**62.2**	**103.0**	**105.2**
	DOĞAL GAZ	*Natural Gas*	**17,225.5**	**15,289.4**	**13,939.9**	**14,355.0**
Ş	TERMİK TOPLAM	*Thermal Total*	**42,446.5**	**37,881.0**	**36,635.9**	**32,112.4**
	HİDROLİK +JEOTERMAL+RÜZGAR TOPLAM	*Hydro+Jeothermal+Wind Total*	**28,338.2**	**41,377.4**	**36,888.2**	**38,311.1**
	TOPLAM	*Total*	**70,784.8**	**79,258.3**	**73,524.1**	**70,423.5**
BAĞLI ORTAKLIKLAR *Affiliated partnerships Of EÜAŞ*	LİNYİT	*Lignite*	11,974.5	10,524.2	13,407.6	13,767.6
	DOĞAL GAZ	*Natural Gas*	6,694.4	5,749.9	5,419.0	6,383.9
	TERMİK TOPLAM	*Thermal Total*	**18,668.9**	**16,274.1**	**18,826.5**	**20,151.5**
MOBİL SANTRALLAR *MOBILE P.P.*	FUEL-OİL	*Fuel Oil*	**0.0**	**0.0**	**0.0**	**0.0**
	MOTORİN	*Diesel oil*		**0.0**		
	TERMİK TOPLAM	*Thermal Total*	**0.0**	**0.0**	**0.0**	**0.0**
OTOPRODÜKTÖRLER ÜRETİM ŞRK. İŞLETME HAKKI DEV. *Autoproducers Production Comp. TOOR*	TAŞKÖMÜRÜ+İTHAL KÖMÜR	*Hard Coal+Imported Coal*	14,744.5	17,221.6	25,343.3	31,845.1
	LİNYİT	*Lignite*	4,719.6	4,771.2	4,874.1	4,748.1
	KÖMÜR TOPLAMI	*Coal Total*	**19,464.1**	**21,992.8**	**30,217.4**	**36,593.3**
	FUEL-OİL	*Fuel Oil*	3,465.4	2,081.6	797.5	876.1
	MOTORİN	*Diesel oil*	345.6	4.3	3.1	657.4
	LPG	*LPG*	0.4	0.0	0.0	0.0
	NAFTA	*Naphtha*	17.6	31.9	0.0	0.0
	SIVI TOPLAMI	*Liquid Total*	**3,829.0**	**2,117.8**	**800.6**	**1,533.5**
	DOĞAL GAZ	*Natural Gas*	**72,174.8**	**77,104.5**	**84,688.7**	**83,760.3**
	YENİLENEBİLİR+ATIK	*Renewables and wastes*	**340.1**	**457.0**	**340.1**	**720.7**
	TERMİK TOPLAM	*Thermal Total*	**95,808.0**	**101,672.5**	**116,046.8**	**122,607.8**
	HİDROLİK +JEOTERMAL+RÜZGAR TOPLAM	*Hydro+Jeothermal+Wind Total*	**9,551.2**	**14,002.8**	**20,868.6**	**26,314.0**
	TOPLAM	*Total*	**105,359.2**	**115,675.3**	**136,915.4**	**148,921.8**
TÜRKİYE *TURKEY*	TAŞKÖMÜRÜ+İTHAL KÖMÜR	*Hard Coal+Imported Coal*	16,595.6	19,104.3	27,347.5	33,324.2
	LİNYİT	*Lignite*	39,089.5	35,942.1	38,870.4	34,688.9
	KÖMÜR TOPLAMI	*Coal Total*	**55,685.1**	**55,046.4**	**66,217.9**	**68,013.1**
	FUEL-OİL	*Fuel Oil*	4,439.8	2,143.8	900.5	981.3
	MOTORİN	*Diesel oil*	345.8	4.3	3.1	657.4
	LPG	*LPG*	0.4	0.0	0.0	0.0
	NAFTA	*Naphtha*	17.6	31.9	0.0	0.0
	SIVI TOPLAMI	*Liquid Total*	**4,803.5**	**2,180.0**	**903.6**	**1,638.7**
	DOĞAL GAZ	*Natural Gas*	**96,094.7**	**98,143.7**	**104,047.6**	**104,499.2**
	YENİLENEBİLİR+ATIK	*Renewables and wastes*	**340.1**	**457.5**	**469.2**	**720.7**
	TERMİK TOPLAM	*Thermal Total*	**156,923.4**	**155,827.6**	**171,638.3**	**174,871.7**
	HİDROLİK +JEOTERMAL+RÜZGAR TOPLAM	*Hydro+Jeothermal+Wind Total*	**37,889.5**	**55,380.1**	**57,756.8**	**64,625.1**
	TÜRKİYE TOPLAMI	*TURKEY'S TOTAL*	**194,812.9**	**211,207.7**	**229,395.1**	**239,496.8**

Table 7: (http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/uretim%20tuketim(23-47)/34(84-12).xls)

TÜRKİYE ELEKTRİK ENERJİSİ ÜRETİM - TÜKETİM VE KAYIPLARININ YILLAR İTİBARİYLE GELİŞİMİ
ANNUAL DEVELOPMENT OF ELECTRICITY GENERATION- CONSUMPTION AND LOSSES IN TURKEY
(1984-2011)

http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/uretim%20tuketim(23-47)/34(84-12).xls (File No: 34)

YILLAR / YEARS	BRÜT ÜRETİM / GROSS GEN.	ARTIŞ % / INCREASE	İÇ İHTİYAÇ / INTERNAL CONSUMP.	%	NET ÜRETİM / NET GEN.	İTHALAT / IMPORTS	ŞEBEKEYE VERİLEN[1] / SUPPLIED TO THE NETWORK[1]		İLETİM / TRANSMISSION	%	DAĞITIM / DISTRIBUTION		%	TOPLAM / TOTAL		%	İHRACAT[2] / EXPORTS[2]	NET TÜKETİM / NET CONS.		ARTIŞ % / INCREASE
							ŞEBEKE KAYBI		*NETWORK LOSS*											
1984	30,613.50	11.90	1,890.70	6.20	28,722.80	2,653.00	31,375.80		1,577.40	5.00	2,163.20		6.90	3,740.60		11.90		27,635.20		13.00
1985	34,218.90	11.80	2,306.80	6.70	31,912.10	2,142.40	34,054.50		1,611.40	4.70	2,734.50		8.00	4,345.90		12.80		29,708.60		7.50
1986	39,694.80	16.00	2,815.00	7.10	36,879.80	776.60	37,656.40		1,344.30	3.60	4,102.40		10.90	5,446.70		14.50		32,209.70		8.40
1987	44,352.90	11.70	2,607.70	5.90	41,745.20	572.10	42,317.30		1,627.40	3.80	3,992.60		9.40	5,620.00		13.30		36,697.30		13.90
1988	48,048.80	8.30	2,400.00	5.00	45,648.80	381.20	46,030.00		2,016.60	4.40	4,291.90		9.30	6,308.50		13.70		39,721.50		8.20
1989	52,043.20	8.30	3,234.50	6.20	48,808.70	558.50	49,367.20		1,544.00	3.10	4,703.20		9.50	6,247.20		12.70		43,120.00		8.60
1990	57,543.00	10.60	3,311.40	5.80	54,231.60	175.50	54,407.10		1,787.20	3.30	4,893.10		9.00	6,680.30		12.30	906.80	46,820.00		8.60
1991	60,246.30	4.70	3,655.20	6.10	56,591.10	759.40	57,350.50		1,437.80	2.50	6,123.40		10.70	7,561.20		13.20	506.40	49,282.90		5.30
1992	67,342.20	11.80	4,237.30	6.30	63,104.90	188.80	63,293.70		1,342.90	2.10	7,651.90		12.10	8,994.80		14.20	314.20	53,984.70		9.50
1993	73,807.50	9.60	3,943.10	5.30	69,864.40	212.90	70,077.30		1,634.90	2.30	8,616.70		12.30	10,251.60		14.60	588.70	59,237.00		9.70
1994	78,321.70	6.10	4,539.10	5.80	73,782.60	31.40	73,814.00	*	1,800.30	2.40	10,042.70	*	13.60	11,843.00		16.00	570.10	61,400.90	*	3.70
1995	86,247.40	10.10	4,388.80	5.10	81,858.60	0.00	81,858.60	*	2,034.90	2.50	11,733.90	*	14.30	13,768.80		16.80	695.90	67,393.90	*	9.80
1996	94,861.70	10.00	4,777.30	5.00	90,084.40	270.10	90,354.50	*	2,461.70	2.70	13,393.10	*	14.80	15,854.80		17.50	343.10	74,156.60	*	10.00
1997	103,295.80	8.90	5,050.20	4.90	98,245.60	2,492.30	100,737.90	*	2,935.50	2.90	15,646.40	*	15.50	18,581.90		18.40	271.00	81,885.00	*	10.40
1998	111,022.40	7.50	5,523.20	5.00	105,499.20	3,298.50	108,797.70	*	3,337.10	3.10	17,457.80	*	16.00	20,794.90		19.10	298.20	87,704.60	*	7.10
1999	116,439.90	4.90	5,738.00	4.90	110,701.90	2,330.30	113,032.20	*	2,985.10	2.60	18,559.90	*	16.40	21,545.00		19.10	285.30	91,201.90	*	4.00
2000	124,921.60	7.30	6,224.00	5.00	118,697.60	3,791.30	122,488.90		3,181.80	2.60	20,574.10	*	16.80	23,755.90		19.40	437.30	98,295.70	*	7.80
2001	122,724.70	-1.80	6,472.60	5.30	116,252.10	4,579.40	120,831.50		3,374.40	2.80	19,954.30	*	16.50	23,328.70	**	19.30	432.80	97,070.00	*	-1.20
2002	129,399.50	5.40	5,672.70	4.40	123,726.80	3,588.20	127,315.00		3,440.70	2.70	20,491.20	*	16.10	23,931.90		18.80	435.10	102,948.00	*	6.10
2003	140,580.50	8.60	5,332.20	3.80	135,248.30	1,158.00	136,406.30		3,330.70	2.40	20,722.00	*	15.20	24,052.70		17.60	587.60	111,766.00	*	8.60
2004	150,698.30	7.20	5,632.60	3.70	145,065.70	463.50	145,529.20		3,422.80	2.40	19,820.20	*	13.60	23,243.00		16.00	1,144.30	121,141.90	*	8.40
2005	161,956.20	7.50	6,487.10	4.00	155,469.10	635.90	156,105.00		3,695.30	2.40	20,348.70	*	13.00	24,044.00		15.40	1,798.10	130,262.90	*	7.50
2006	176,299.80	8.90	6,756.70	3.80	169,543.10	573.20	170,116.30		4,543.80	2.70	19,245.40	*	11.30	23,789.20		14.00	2,235.70	144,091.40	*	10.60
2007	191,558.10	8.70	8,218.40	4.30	183,339.70	864.30	184,204.00		4,523.00	2.50	22,123.60	*	12.00	26,646.60		14.50	2,422.20	155,135.20	*	7.70
2008	198,418.00	3.60	8,656.10	4.40	189,761.90	789.40	190,551.30		4,388.40	2.30	23,093.10	*	12.10	27,481.50		14.40	1,122.20	161,947.60	*	4.40
2009	194,812.90	-1.80	8,193.60	4.20	186,619.30	812.00	187,431.30		3,973.40	2.10	25,018.00	*	13.30	28,991.40		15.50	1,545.80	156,894.10	*	-3.10
2010	211,207.70	8.40	8,161.60	3.90	203,046.10	1,143.80	204,189.90		5,690.50	2.80	24,531.20	*	12.00	30,221.70		14.80	1,917.60	172,050.60	*	9.70
2011	229,395.10	8.60	11,837.40	5.20	217,557.70	4,555.80	222,113.50		4,189.30	1.90	28,180.00	*	12.70	32,369.30		14.60	3,644.60	186,099.60		8.20
2012	239,496.80	4.40	11,789.50	4.92	227,707.30	5,826.70	233,534.00		6,024.70	2.58	29,632.30	*	12.69	35,657.00		15.27	2,953.60	194,923.40	*	4.74

1)Şebekeye Verilen = Net Üretim+İthalat
2) İhracat,Sınırda teslim esasına göre yapıldığından,ihracat ile igili şebeke kaybı,iletim kaybının içinde yer :
*** Kaynak : Türkiye Elektrik Dağıtım ve Tüketim İstatistikleri ,1994-2010 (2011 Geçici)**

1)Supplied to the Network = Net Generation+Import
2)As the export is made on delivery at border basis,its losses are included in the section)
** Source : Electricity Distribution and Consumption Statistics of Turkey ,1994-2010*

Table 8a:Source: http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf

Unit Name	Capacity (MW)	Project Production Potential (GWh)	Firm Production (GWh)	Type	Fuel	Date of Commissioning
Enerji-Sa (Bandirma)	1,000.00	7,540.00	7,540.00	Private	Natural Gas	7-Oct-10
Uğur Enerji Ür. Tic.Ve San. A.Ş. (İlave)	12.00	100.86	100.86	Private	Natural Gas	7-Oct-10
Ziyaret Res (Ziyaret Res Elek.)(İlave)	22.50	0.00	0.00	Private	Wind	13-Oct-10
Kahta I Hes (Erdemyildiz Elek. Ürt.)	7.12	0.00	0.00	Private	Hydro	14-Oct-10
Rotor Elektrik (Gökçedağ Res) (İlave)	2.50	0.00	0.00	Private	Wind	15-Oct-10
Azmak-Ii Reg. Ve Hes (Düzeltme)	-18.07	0.00	0.00	Private	Hydro	25-Oct-10
Itc Adana Biokütle Sant. (Düzeltme)	0.00	0.00	0.00	Private	LFG	25-Oct-10
Enerji-Sa (Bandirma) (Düzeltme)	-69.20	0.00	0.00	Private	Natural Gas	25-Oct-10
Uluabat Kuvvet Tüneli Ve Hes	48.51	0.00	0.00	Private	Hydro	27-Oct-10
Sabunsuyu Ii Hes (Ang Enerji Elk.)	7.35	21.00	12.00	Private	Hydro	28-Oct-10
Eren Enerji Elektrik Ür. A.Ş. (İlave)	600.00	4,005.88	4,005.88	Private	Coal	1-Nov-10
Burç Bendi Ve Hes (Akkur Enerji)	27.33	0.00	0.00	Private	Hydro	4-Nov-10
Karadeniz El. (Uzundere-1 Hes)(İlave)	31.08	82.44	46.46	Private	Hydro	7-Nov-10
Güzelçay-Ii Hes (İlk Elektrik Enerji)	4.96	26.33	14.70	Private	Hydro	11-Nov-10
Murgul Bakir (Ç.Kaya) (İlave)	19.60	40.50	31.59	Private	Hydro	11-Nov-10
Kuyucak Res (Alize Enerji Üret.)	8.00	0.00	0.00	Private	Wind	11-Nov-10
Soma Res (Bilgin Wind San.)(İlave)	30.00	0.00	0.00	Private	Wind	11-Nov-10
Uluabat Kuvvet Tüneli Ve Hes (İlave)	48.51	0.00	0.00	Private	Hydro	25-Nov-10
Marmara Pamuklu Mensucat (İlave)	26.19	203.45	203.45	Autoproducer	Natural Gas	25-Nov-10
Fritolay Gida San.Ve Tic A.Ş. (İlave)	0.33	3.00	3.00	Autoproducer	Biogas	26-Nov-10
Egemen 1 Hes (Enersis Elektrik)	8.82	0.00	0.00	Private	Hydro	26-Nov-10
Reşadiye 1 Hes (Turkon Mng Elekt.)	15.68	0.00	0.00	Private	Hydro	26-Nov-10
Aliağa Çakmaktepe Enerji (İlave)	69.84	557.92	557.92	Private	Natural Gas	26-Nov-10
Yedigöze Hes (Yedigöze Elektrik)	155.33	474.00	268.00	Private	Hydro	2-Dec-10
Sönmez Enerji Üretim (Uşak) (İlave)	2.56	19.77	19.77	Private	Natural Gas	7-Dec-10
AK-ENERJİ (UŞAK OSB)(Uşak-Ak.En.)	-15.24	0.00	0.00	Private	Natural Gas	9-Dec-10
Ak-Enerji(Dg+N) (Deba-Denizli)	-15.60	0.00	0.00	Private	Natural Gas	9-Dec-10
Kuyucak Res (Alize Enerji Ür.) (İlave)	17.60	0.00	0.00	Private	Wind	9-Dec-10
Umut Iii Reg. Ve Hes (Nisan Elektr.)	12.00	26.00	15.00	Private	Hydro	13-Dec-10

Unit Name	Capacity (MW)	Project Production Potential (GWh)	Firm Production (GWh)	Type	Fuel	Date of Commissioning
Tüpraş Rafineri (İzmit) (İlave)	40.00	258.82	258.82	Autoproducer	Natural Gas	15-Dec-10
Polyplex Europa Polyester Film	7.81	61.00	61.00	Autoproducer	Natural Gas	16-Dec-10
Altek Alarko Elektrik Santrallari	21.89	151.36	151.36	Private	Natural Gas	18-Dec-10
Aksa Enerji (Demirtaş/Bursa)	-1.40	0.00	0.00	Private	Waste	21-Dec-10
Sares Res (Garet Enerji Üretim)	15.00	0.00	0.00	Private	Wind	22-Dec-10
Feke 2 Baraji Ve Hes (Akkur Enerji)	69.34	0.00	0.00	Private	Hydro	24-Dec-10
Egemen 1b Hes (Enersis Elektrik)	11.10	0.00	0.00	Private	Hydro	28-Dec-10
Eren Enerji Elektrik Ür. A.Ş. (İlave)	600.00	4,005.88	4,005.88	Private	Coal	29-Dec-10
Rasa Enerji (Van) (İlave)	10.12	64.41	64.41	Private	Natural Gas	29-Dec-10
Kalkandere Reg. Ve Yokuşlu Hes	14.54	0.00	0.00	Private	Hydro	30-Dec-10
Turguttepe Res (Sabaş Elektrik Ür.)	22.00	0.00	0.00	Private	Wind	30-Dec-10
AK TEKSTİL-1 (G.Antep)	-13.04	0.00	0.00	Autoproducer	FUEL-OİL	31-Dec-10
Silopi Elektrik Ür. A.Ş. (Esenboğa)	-44.78	0.00	0.00	Private	FUEL-OİL	31-Dec-10
International Hospital İstanbul Aş.	0.77	6.00	6.00	Autoproducer	Natural Gas	31-Dec-10
Tüpraş Rafineri (İzmit) (Düzeltme)	-39.14	0.00	0.00	Autoproducer	Natural Gas	31-Dec-10
Yalova Elyaf	-12.30	0.00	0.00	Autoproducer	Natural Gas	31-Dec-10

Table 8b:
Source: http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2011.pdf

Unit Name	Capacity (Mw)	Project Production Potential (Gwh)	Firm Production (Gwh)	Type	Fuel	Date Of Commissioning
Akim Enerji Başpinar (Süper Film)	25.32	177.00	177.00	Private	Natural Gas	Unknown
Aksa Akrilik (İthal Köm.+D.G)	25.00	175.00	175.00	Private	Natural Gas	Unknown
Aksa Enerji (Antalya)	300.00	1,800.00	1,800.00	Private	Natural Gas	Unknown
Aksa Enerji (Antalya) (İlave)	300.00	1,800.00	1,800.00	Private	Natural Gas	Unknown
Aldaş Altyapi Yönetim Danişmanlik	1.95	15.00	15.00	Autoproducer	Natural Gas	Unknown
Aliağa Çakmaktepe Enerji (İlave)	130.95	986.25	986.25	Private	Natural Gas	Unknown
Aliağa Çakmaktepe Enerji (İlave)	8.73	67.76	67.76	Private	Natural Gas	Unknown
Bekirli Tes (İçdaş Elektrik En.)	600.00	4.32	4.32	Private	Imported Coal	Unknown
Bosen Enerji Elektrik Üretim Aş.	93.00	698.09	698.09	Private	Natural Gas	Unknown
Boyteks Tekstil San. Ve Tic. A.Ş.	8.60	67.00	67.00	Private	Natural Gas	Unknown
Cengiz Çift Yakitli K.Ç.E.S.	131.34	985.00	985.00	Private	Natural Gas	Unknown
Cengiz Enerji San.Ve Tic.A.Ş.	35.00	281.29	281.29	Private	Natural Gas	Unknown
Eti Bor (Borik Asit)(Emet) (Düzeltme)	0.60	4.47	4.47	Autoproducer	Natural Gas	Unknown
Fraport Ic İçtaş Antalya Havalimani	8.00	64.00	64.00	Autoproducer	Natural Gas	Unknown
Global Enerji (Pelitlik)	4.00	29.91	29.91	Private	Natural Gas	Unknown

Unit Name	Capacity (Mw)	Project Production Potential (Gwh)	Firm Production (Gwh)	Type	Fuel	Date Of Commissioning
Gordion Avm (Redevco Üç Emlak)	2.01	15.00	15.00	Autoproducer	Natural Gas	Unknown
Goren-1 (Gaziantep Organize San.)	48.65	277.00	277.00	Private	Natural Gas	Unknown
Gülle Enerji(Çorlu) (İlave)	3.90	18.43	18.43	Private	Natural Gas	Unknown
Hamitabat (Lisans Tadili)	36.00	244.15	244.15	Government	Natural Gas	Unknown
Hasirci Tekstil Tic. Ve San. Ltd. Şti.	2.00	15.00	15.00	Autoproducer	Natural Gas	Unknown
Hg Enerji Elektrik Üret. San.Tic. A.Ş.	52.38	366.00	366.00	Private	Natural Gas	Unknown
Isparta Mensucat (Isparta)	4.30	33.00	33.00	Autoproducer	Natural Gas	Unknown
İstanbul Sabiha Gökçen Ul.Ar. Hav.	4.00	32.00	32.00	Autoproducer	Natural Gas	Unknown
Karkey (Silopi 1)	100.44	697.67	697.67	Private	F.Oil	Unknown
Knauf İnş. Ve Yapi Elemanlari Sn.	1.56	12.00	12.00	Autoproducer	Natural Gas	Unknown
Lokman Hekim Engürü Sağ.(Sincan)	0.51	44.00	44.00	Autoproducer	Natural Gas	Unknown
Mardin-Kiziltepe (Aksa Enerji)	32.10	225.00	225.00	Private	F.Oil	Unknown
Mosb Enerji Elektrik Üretim Ltd. Şti.(İlave)	43.50	351.86	351.86	Private	Natural Gas	Unknown
Nuh Enerji El. Ürt.A.Ş. (Enerji Sant.-2)	119.98	900.00	900.00	Private	Natural Gas	Unknown
Odaş Doğalgaz Kçs (Odaş Elektrik)	54.96	415.00	415.00	Private	Natural Gas	Unknown
Polyplex Europa Polyester Film	3.90	31.45	31.45	Autoproducer	Natural Gas	Unknown
Samsun Tekkeköy En. San. (Aksa En.)	131.34	980.00	980.00	Private	Natural Gas	Unknown
Samur Hali A.Ş.	4.30	33.00	33.00	Autoproducer	Natural Gas	Unknown
Saray Hali A.Ş.	4.29	33.00	33.00	Autoproducer	Natural Gas	Unknown
Şanliurfa Osb (Rasa Enerji Ür. A.Ş.)	116.76	800.00	800.00	Private	Natural Gas	Unknown
Aksu Reg. Ve Hes (Kalen Enerji)	5.20	16.00	12.00	Private	Hydro	Unknown
Değirmendere (Kadirli) (Ka-Fnih Elek.)	0.50	1.20	0.80	Op.Rights Transfer	Hydro	Unknown
Derme (Kayseri Ve Civari Enerji)	4.50	14.00	7.00	Op.Rights Transfer	Hydro	Unknown
Erkenek (Kayseri Ve Civari Enerji)	0.32	1.23	0.74	Op.Rights Transfer	Hydro	Unknown
Balkondu I Hes (Bta Elektrik Enerji)	9.19	33.00	20.00	Private	Hydro	Unknown
Batman	0.48	1.16	1.08	Private	Hydro	Unknown
Girlevik (Boydak Enerji)	3.04	21.00	19.00	Op.Rights Transfer	Hydro	Unknown
Berdan	10.20	47.20	15.00	Private	Hydro	Unknown
Boğuntu Hes (Beyobasi Enerji)	3.80	17.00	10.00	Private	Hydro	Unknown
Hakkari (Otluca) (Nas Enerji A.Ş.)	1.28	6.00	5.00	Op.Rights Transfer	Hydro	Unknown
Hasanlar	9.35	39.90	29.60	Government	Hydro	Unknown
Bünyan (Kayseri Ve Civari El. T.A.Ş)	1.16	3.40	3.20	Private	Hydro	Unknown
Çakirman Reg. Ve Hes (Yusaka En.)	6.98	22.00	15.00	Private	Hydro	Unknown
İnegöl(Cerrah) (Kent Solar Elektrik)	0.27	1.00	0.80	Op.Rights Transfer	Hydro	Unknown
İznik (Dereköy) (Kent Solar Elektrik)	0.24	1.00	0.90	Op.Rights Transfer	Hydro	Unknown
Çamardi (Kayseri Ve Civari El. T.A.Ş)	0.07	0.01	0.01	Private	Hydro	Unknown
Karaçay (Osmaniye) (Ka-Fnih Elektrik)	0.40	2.30	2.00	Op.Rights Transfer	Hydro	Unknown
Çamlica Iii Hes (Çamlica Elektrik)	27.62	43.00	25.00	Private	Hydro	Unknown
Çamlikaya Reg.Ve Hes (Çamlikaya En)	2.82	6.71	3.88	Private	Hydro	Unknown
Çanakçi Hes (Can Enerji Entegre)	4.63	19.43	10.96	Private	Hydro	Unknown
Çanakçi Hes (Can Enerji Entegre)	4.63	19.43	10.96	Private	Hydro	Unknown
Çeşmebaşi Reg. Ve Hes (Gimak En.)	8.20	28.00	17.00	Private	Hydro	Unknown
Kayadibi (Bartin) (İvme Elektromek.)	0.46	2.30	2.00	Op.Rights Transfer	Hydro	Unknown

Unit Name	Capacity (Mw)	Project Production Potential (Gwh)	Firm Production (Gwh)	Type	Fuel	Date Of Commissioning
Kernek (Kayseri Ve Civari Enerji)	0.83	0.80	0.60	Op.Rights Transfer	Hydro	Unknown
Çukurçayi Hes (Aydemir Elektrik Ür.)	1.80	8.00	4.00	Private	Hydro	Unknown
Daren Hes Elektrik (Seyrantepe)	49.70	181.13	140.88	Private	Hydro	Unknown
Duru 2 Reg. Ve Hes (Durucasu Elek.)	4.49	22.00	13.00	Private	Hydro	Unknown
Kovada-I (Batiçim Enerji Elektrik)	8.25	4.10	1.60	Op.Rights Transfer	Hydro	Unknown
Kovada-Ii (Batiçim Enerji Elektrik)	51.20	36.20	24.40	Op.Rights Transfer	Hydro	Unknown
Erenköy Reg. Ve Hes (Nehir Enerji)	21.46	87.00	49.00	Private	Hydro	Unknown
Eşen-1 Hes (Göltaş Enerji Elektrik)	30.00	120.00	65.00	Private	Hydro	Unknown
Eşen-1 Hes (Göltaş Enerji Elektrik)	30.00	120.00	65.00	Private	Hydro	Unknown
Gökmen Reg. Ve Hes (Su-Gücü Elekt.)	2.87	13.00	8.00	Private	Hydro	Unknown
Kuzuculu (Dörtyol) (Ka-Fnih Elektrik)	0.27	1.30	1.00	Op.Rights Transfer	Hydro	Unknown
M.Kemalpaşa (Suuçtu) (Kent Solar)	0.47	1.50	1.30	Op.Rights Transfer	Hydro	Unknown
Malazgirt (Mostar Enerji Elektrik)	1.22	4.00	3.00	Op.Rights Transfer	Hydro	Unknown
Tekirdağ-Çorlu Teks.Tes.(Nil Örme)	2.68	21.00	21.00	Autoproducer	Natural Gas	Unknown
Tirenda Tire Enerji Üretim A.Ş.	58.38	410.00	410.00	Private	Natural Gas	Unknown
Toros Tarim (Mersin) (Nafta+D.Gaz)	12.14	96.00	96.00	Autoproducer	Naphta	Unknown
Tüpraş O.A. Rafineri (Kırıkkale) (İlave)	12.00	84.78	84.78	Autoproducer	Naphta	Unknown
Yeni Uşak Enerji Elektrik Santrali	8.73	65.00	65.00	Private	Natural Gas	Unknown
Zorlu Enerji (B.Karıştıran)	7.20	54.07	54.07	Private	Natural Gas	Unknown
Adilcevaz (Mostar Enerji Elektrik)	0.39	0.80	0.50	Op.Rights Transfer	Hydro	Unknown
Ahlat (Mostar Enerji Elektrik)	0.20	0.60	0.50	Op.Rights Transfer	Hydro	Unknown
Hacininoğlu Hes (Enerji-Sa Enerji)	71.14	180.00	102.00	Private	Hydro	Unknown
Hacininoğlu Hes (Enerji-Sa Enerji)	71.14	180.00	102.00	Private	Hydro	Unknown
Hasanlar Hes (Düzce Enerji Birliği)	4.68	21.00	12.00	Private	Hydro	Unknown
İncirli Reg. Ve Hes (Laskar Enerji)	25.20	126.00	71.00	Private	Hydro	Unknown
Karasu 4-3 Hes (İdeal Enerji Üretimi)	4.60	22.00	12.00	Private	Hydro	Unknown
Karasu 5 Hes (İdeal Enerji Üretimi)	4.10	24.00	14.00	Private	Hydro	Unknown
Bayburt (Boydak Enerji)	0.40	1.90	1.70	Op.Rights Transfer	Hydro	Unknown
Karasu I Hes (İdeal Enerji Üretimi)	3.84	19.00	11.00	Private	Hydro	Unknown
Besni Kayseri Ve Civari Enerji)	0.27	0.50	0.20	Op.Rights Transfer	Hydro	Unknown
Kazankaya Reg. Ve İncesu Hes (Aksa)	15.00	48.00	27.00	Private	Hydro	Unknown
Kesme Reg. Ve Hes (Kivanç Enerji)	2.31	8.02	4.51	Private	Hydro	Unknown
Kesme Reg. Ve Hes (Kivanç Enerji)	2.31	8.02	4.51	Private	Hydro	Unknown
Çağ-Çağ (Nas Enerji A.Ş.)	14.40	25.00	22.00	Op.Rights Transfer	Hydro	Unknown
Kiran Hes (Arsan Enerji A.Ş.)	9.74	41.00	23.00	Private	Hydro	Unknown
Koruköy Hes (Akar Enerji San. Tic.)	3.03	22.00	13.00	Private	Hydro	Unknown
Köyobasi Hes (Şirikoğlu Elektrik)	1.07	5.00	3.00	Private	Hydro	Unknown
Kozdere Hes (Ado Madencilik Elkt.)	3.15	14.00	8.00	Private	Hydro	Unknown
Kulp I Hes (Yildizlar Enerji Elk.Ür.)	22.92	78.00	44.00	Private	Hydro	Unknown
Çemişkezek (Boydak Enerji)	0.12	0.80	0.50	Op.Rights Transfer	Hydro	Unknown
Molu Enerji (Zamantı-Bahçelik Hes)	4.17	30.00	30.00	Private	Hydro	Unknown
Muratli Reg. Ve Hes (Armahes El.)	26.70	94.00	55.00	Private	Hydro	Unknown
Narinkale Reg. Ve Hes (Ebd Enerji)	30.40	108.00	61.00	Private	Hydro	Unknown

Unit Name	Capacity (Mw)	Project Production Potential (Gwh)	Firm Production (Gwh)	Type	Fuel	Date Of Commissioning
Ören Reg. Ve Hes (Çelikler Elektrik)	6.64	29.00	16.00	Private	Hydro	Unknown
Otluca Ii Hes (Beyobasi Enerji Ür.)	6.36	27.00	15.00	Private	Hydro	Unknown
Pinarbaşi (Kayseri Ve Civari El.T.A.Ş)	0.10	0.40	0.30	Op.Rights Transfer	Hydro	Unknown
Poyraz Hes (Yeşil Enerji Elektrik)	2.66	10.00	6.00	Private	Hydro	Unknown
Saraçbendi Hes (Çamlica Elektrik)	25.48	101.00	57.00	Private	Hydro	Unknown
Sarikavak Hes (Eser Enerji Yat. Aş.)	8.06	43.00	24.00	Private	Hydro	Unknown
Sayan Hes (Karel Elektrik Üretim)	14.90	47.00	27.00	Private	Hydro	Unknown
Sefaköy Hes (Pure Enerji Üretim Aş.)	33.11	121.00	68.00	Private	Hydro	Unknown
Seyrantepe Hes (Düzeltme))	7.14	26.02	20.24	Private	Hydro	Unknown
Sizir (Kayseri Ve Civari El. T.A.Ş)	5.76	46.00	35.00	Op.Rights Transfer	Hydro	Unknown
Söğütlükaya (Posof Iii) Hes	6.13	31.00	18.00	Private	Hydro	Unknown
Tefen Hes (Aksu Madencilik San.)	11.00	47.00	26.67	Private	Hydro	Unknown
Tefen Hes (Aksu Madencilik San.)	22.00	94.00	53.33	Private	Hydro	Unknown
Turunçova(Finike) (Turunçova En.)	0.55	1.50	0.80	Op.Rights Transfer	Hydro	Unknown
Tuztaşi Hes (Gürüz Elektrik Ür.)	1.61	10.00	6.00	Private	Hydro	Unknown
Uludere (Nas Enerji A.Ş.)	0.64	3.20	2.60	Op.Rights Transfer	Hydro	Unknown
Üzümlü Hes (Akgün Enerji Üretim)	11.36	41.00	23.00	Private	Hydro	Unknown
Varto (Mostar Enerji Elektrik)	0.29	0.80	0.60	Op.Rights Transfer	Hydro	Unknown
Yamaç Hes (Yamaç Enerji Üretim A.Ş.)	5.46	17.00	10.00	Private	Hydro	Unknown
Yaprak Ii Hes (Nisan Elektromek.)	5.40	16.00	10.50	Private	Hydro	Unknown
Yaprak Ii Hes (Nisan Elektromek.)	5.40	16.00	10.50	Private	Hydro	Unknown
Yaşil Hes (Yaşil Enerji Elektrik)	1.52	6.00	3.20	Private	Hydro	Unknown
Yaşil Hes (Yaşil Enerji Elektrik)	2.28	9.00	4.80	Private	Hydro	Unknown
Yedigöl Reg. Ve Hes (Yedigöl Hidr.)	21.90	77.00	42.00	Private	Hydro	Unknown
Yedigöze Hes (Yedigöze Elek.) (İlave)	155.33	474.83	133.95	Private	Hydro	Unknown
Ayrancilar Hes (Muradiye Elektrik)	13.38	53.34	31.16	Private	Hydro	Unknown
Ayrancilar Hes (Muradiye Elektrik)	18.72	74.64	43.73	Private	Hydro	Unknown
Bayramhacili Baraji Ve Hes	47.00	175.00	95.00	Private	Hydro	Unknown
Cevher I-Ii Reg. Ve Hes (Özcevher En.)	16.36	65.00	32.00	Private	Hydro	Unknown
Karasu Ii Hes (İdeal Enerji Üretimi)	3.08	13.00	8.00	Private	Hydro	Unknown
Bandirma Enerji (Bandirma Res)	3.00	10.50	9.50	Private	Wind	Unknown

Table 8c
Source:http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2012.pdf

Name Of Unit	Fuel	Ownership	Capacity (MW)	Project Production Potential (Gwh)	Firm Production Gwh	Date of Commissioning
Acarsoy Termik Kom.Çev.Sant. (Acarsoy En.)	Natural Gas	Private	50	375	375	27/12/12
Afyon Dgkç (Dedeli Doğalgaz Elektrik Ür.)	Natural Gas	Private	126.1	945	945	
Age Doğalgaz Kom. Çev. Sant. (Age Denizli)	Natural Gas	Private	94	1057	705	
Age Doğalgaz Kom. Çev. Sant. (Age Denizli)	Natural Gas	Private	47	1057	352	
Akdeniz Kimya San. Ve Tic. A.Ş.	Natural Gas	Auto Producer	2.022	15	15	

Name Of Unit	Fuel	Ownership	Capacity (MW)	Project Production Potential (Gwh)	Firm Production Gwh	Date of Commissioning
Akdeniz Kimya San. Ve Tic. A.Ş.	Natural Gas	Auto Producer	2.022	15	15	
Akköprü (Dalaman)	Hydro	EUAS	57.5	171.5	88	
Akköprü (Dalaman)	Hydro	EUAS	57.5	171.5	88	
Akköy Ii Hes (Akköy Enerji A.Ş.)	Hydro	Private	114.84	449.5	254	
Akköy Ii Hes (Akköy Enerji A.Ş.)	Hydro	Private	114.84	449.5	254	
Akköy-Espiye Hes (Koni İnşaat San. A.Ş.)	Hydro	Private	8.912	40	22	
Aksa Akrilik Kimya San. A.Ş. (İthal Köm.+D.G)	Natural Gas	Private	75	525	525	
Aksu Res (Aksu Temiz Enerji Elektrik Üretim)	Wind	Private	36	0	0	
Aksu Res (Aksu Temiz Enerji Elektrik Üretim)	Wind	Private	30	0	0	
Aksu Res (Aksu Temiz Enerji Elektrik Üretim)	Wind	Private	6	0	0	
Alabalik Reg. Ve Hes Santrali I-Ii (Darboğaz Elk. Ür. San.)	Hydro	Private	13.84	0	0	
Ales Doğalgaz Kom. Çev. Sant. (Ales Elekt.)	Natural Gas	Private	49	370	370	29/12/12
Alpaslan I (Elektrik Üretim A.Ş.)	Hydro	EUAS	80	244	209	
Alpaslan I (Elektrik Üretim A.Ş.)	Hydro	EUAS	80	244	209	
Altinyildiz Mensucat Ve Konf. Fab. (Tekirdağ)	Natural Gas	Auto Producer	5.5	38	38	
Anak Hes (Kor-En Korkuteli Elek. Üret. San.)	Hydro	Private	3.76	15	9	
Arakli-1 Reg. Ve Hes(Yüceyurt Enerji Üretim)	Hydro	Private	10.203	39	21.84	
Arakli-1 Reg. Ve Hes(Yüceyurt Enerji Üretim)	Hydro	Private	13.067	50	28	
Arca Hes (Gürsu Temiz Enerji Üretim A.Ş.)	Hydro	Private	5.45	0	0	
Arca Hes (Gürsu Temiz Enerji Üretim A.Ş.)	Hydro	Private	10.9	0	0	
Arel Enerji Biyokütle Tesisi (Arel Çevre)	Solid Waste	Private	1.2	9	9	
Arel Enerji Biyokütle Tesisi (Arel Çevre)	Solid Waste	Private	1.2	9	9	
Arpa Reg. Ve Hes (Mck Elektrik Üretim A.Ş.)	Hydro	Private	32.412	78	44	
Asaş Alüminyum Sanayi Ve Ticaret A.Ş.	Natural Gas	Auto Producer	8.6	65	65	
Ataköy (Zorlu Doğal Elektrik Üretimi A.Ş.)	Hydro	ORT	5.525	20	11	
Avcilar Hes (Avcilar Enerji Elektrik Üret.)	Hydro	Private	16.743	49	28	
Ayancik Hes (İlk Elektrik Enerji Üretimi Sn.)	Hydro	Private	15.6	65	37	
Ayrancilar Hes (Muradiye Elektrik Üretim)	Hydro	Private	9.359	0	0	
Bağiştaş Ii Hes (Akdenizli Elektrik Üretim)	Hydro	Private	32.4	122	69	23/12/12
Balikesir Res (Bares Elektrik Üretim A.Ş.)	Wind	Private	112.8	52.90	45.10	
Balikesir Res (Bares Elektrik	Wind	Private	112.8	63.48	54.12	

Name Of Unit	Fuel	Ownership	Capacity (MW)	Project Production Potential (Gwh)	Firm Production Gwh	Date of Commissioning
Üretim A.Ş.)						
Balikesir Res (Enerjisa Enerji Üretim A.Ş.)	Wind	Private	112.8	95.23	81.18	
Balikesir Res (Enerjisa Enerji Üretim A.Ş.)	Wind	Private	112.8	63.48	54.12	
Balikesir Res (Enerjisa Enerji Üretim A.Ş.)	Wind	Private	112.8	74.06	63.14	
Balikesir Res (Enerjisa Enerji Üretim A.Ş.)	Wind	Private	112.8	84.65	72.16	
Balkusan Baraji Ve Hes 1 Nolu Sant. (Karen)	Hydro	Private	13	0	0	
Balkusan Baraji Ve Hes 2 Nolu Sant. (Karen)	Hydro	Private	25	0	0	
Balsuyu Mensucat San. Ve Tic. A.Ş.	Natural Gas	Auto Producer	9.73	68	68	
Bamen Kojenerasyon (Başyazicioğlu Tekstil)	Natural Gas	Auto Producer	2.145	14	14	
Bandirma Res (Yapisan Elektrik Üretim A.Ş.)	Wind	Private	5	0	0	
Bangal Reg. Ve Kuşluk Hes (Kudret Enerji)	Hydro	Private	17	0	0	
Bektemur Hes (Diz-Ep Elektrik Üretim Ltd.)	Hydro	Private	3.492	20	11	
Bereket Enerji Üretim A.Ş. (Biogaz)	Solid Waste	Private	0.635	0	0	
Beyköy (Zorlu Doğal Elektrik Üretimi A.Ş.)	Hydro	ORT	16.8	87	87	
Beypi Beypazari Tarimsal Üretim Pz. Sn. A.Ş.	Natural Gas	Auto Producer	8.6	63	63	
Bilecik Doğalgaz Çs. (Tekno Doğalgaz Çev.)	Natural Gas	Private	25.8	190	190	
Bilecik Doğalgaz Kçs. (Dedeli Doğalgaz El.)	Natural Gas	Private	19.4	142	142	
Bilecik Doğalgaz Kçs. (Dedeli Doğalgaz El.)	Natural Gas	Private	107.03	803	803	
Bilkur Tekstil Boya Tic. A.Ş.	Natural Gas	Auto Producer	2	14	14	
Binatom Elektrik Üretim A.Ş. (Emet/Kütahya)	Natural Gas	Private	2.145	16	16	
Binatom Elektrik Üretim A.Ş. (Emet/Kütahya)	Natural Gas	Private	2.145	16	16	
Binatom Elektrik Üretim A.Ş. (Emet/Kütahya)	Natural Gas	Private	4.044	30	30	
Binatom Elektrik Üretim A.Ş. (Emet/Kütahya)	Natural Gas	Private	2.022	15	15	
Bis Enerji(Sanayi/ Bursa)	Natural Gas	Private	48	361.57	361.57	
Bosen Enerji Elektrik Üretim Aş.(Bursa)	Natural Gas	Private	27.96	209.86	209.86	
Boyabat Baraji Ve Hes (Boyabat Elektrik)	Hydro	Private	513	0	0	
Bozyaka Res (Kardemir Haddecilik Ve Elekt.)	Wind	Private	12	0	0	
Büyükdüz Hes (Ayen Enerji A.Ş.)	Hydro	Private	68.862	192	109	
Çağlayan Hes (Çağlayan Hes Enerji Üretim)	Hydro	Private	6	21	12	

Name Of Unit	Fuel	Ownership	Capacity (MW)	Project Production Potential (Gwh)	Firm Production Gwh	Date of Commissioning
Can 1 Hes (Hed Elektrik Üretim A.Ş.)	Hydro	Private	1.844	10	6	
Çarşamba Hes (Çarşamba Enerji Elektrik)	Hydro	Private	11.31	63	36	
Ceyhan Hes (Berkman Hes) (Enova En Üret.)	Hydro	Private	12.605	50.35	31.34	
Çildir (Zorlu Doğal Elektrik Üretimi A.Ş.)	Hydro	ORT	15.36	30	20	
Çinar-1 Hes (Aycan Enerji Üretim Tic. Ve Sn.)	Hydro	Private	9.26	34	19	
Çukurçayi Hes (Aydemir Elektrik Üretim A.Ş.)	Hydro	Private	1.8	4	2	
Cuniş Reg. Ve Hes (Rinerji Rize Elektrik Ür.)	Hydro	Private	2.8	12	7	
Cuniş Reg. Ve Hes (Rinerji Rize Elektrik Ür.)	Hydro	Private	5.6	24	14	
Dağpazari Res (Enerjisa Enerji Üretim A.Ş.)	Wind	Private	36	0	0	
Dağpazari Res (Enerjisa Enerji Üretim A.Ş.)	Wind	Private	3	0	0	
Demirciler Hes (Pak Enerji Üretimi San.)	Hydro	Private	3.124	0	0	
Demirciler Hes (Pak Enerji Üretimi San.)	Hydro	Private	5.317	0	0	
Deniz Jeotermal (Maren Maraş Elektrik)	Geothermal	Private	24	0	0	
Denizli Jeotermal (Zorlu Doğal Elek. Ür.A.Ş.)	Lignite	ORT	15	105	105	
Diğerleri (İzole) (Ereğli Şeker)	Fuel Oil	Auto Producer	9.5	30	30	
Diğerleri (İzole) (Kirşehir Şeker)	Fuel Oil	Auto Producer	5.9	18	18	
Dinar Res (Olgu Enerji Yatirim Üretim)	Wind	Private	16.1	0	0	
Doğankaya Hes (Mar-En Enerji Üret. Tic.)	Hydro	Private	20.55	98	56	
Dumlu Hes (Dumlu Enerji Elektrik Üretim)	Hydro	Private	3.982	9	5	
Durmazlar Makina Sanayi Ve Ticaret A.Ş.	Natural Gas	Auto Producer	1.286	10	10	
Durum Gida Termik Kojen. Sant. (Durum Gida)	Natural Gas	Auto Producer	3.6	29	29	
Ege Seramik Enerji Santrali	Natural Gas	Auto Producer	13.08	90	90	
Eger Hes (Eger Elektrik Üretim Ltd. Şti.)	Hydro	Private	1.92	10	6	
Ekim Biyogaz (Ekim Grup Elektrik Üretim)	Solid Waste	Private	1.2	10	10	
Enerji-Sa (Çanakkale)	Natural Gas	Private	0.915	7.32	7.32	
Enerji-Sa (Köseköy)	Natural Gas	Private	120	930	930	
Enerji-Sa (Mersin)	Natural Gas	Private	1.465	66	520	
Enerji-Sa (Zeytinli/Adana)	Natural Gas	Private	0.83	5.81	5.81	
Erdemir(F.O+K.G+Y.F.G+Dg)(Ereğli-Zonguldak)	Natural Gas	Auto Producer	53.9	327	327	

Name Of Unit	Fuel	Ownership	Capacity (MW)	Project Production Potential (Gwh)	Firm Production Gwh	Date of Commissioning
Eren Enerji Elektrik Üretim A.Ş.	Imported Coal	Private	30	196	196	
Erik Hes (Elektrik Üretim A.Ş.)	Hydro	EUAS	6.48	34	21	
Ermenek (Elektrik Üretim A.Ş.)	Hydro	EUAS	151.2	593.5	408.5	
Ermenek (Elektrik Üretim A.Ş.)	Hydro	EUAS	151.2	593.5	408.5	
Erzurum Meydan Avm (Redevko Bir Emlak)	Natural Gas	Auto Producer	2.436	16	16	
Es Es Eskişehir Enerji San. Ve Tic. A.Ş.	Biogas	Auto Producer	2.042	15	15	
Esendurak Hes (Meral Elektrik Üretim)	Hydro	Private	9.33	0	0	
Feke 1 Hes (Akkur Enerji Üretim Tic. Ve San.)	Hydro	Private	29.4	0	0	
Feke 2 Baraji Ve Hes (Akkur Enerji Üretim)	Hydro	Private	69.34	0	0	
Findik I Hes (Adv Elektrik Üretim Ltd. Şti.)	Hydro	Private	11.25	48	27	27/12/2012
Gaski Merkez Atik Su Aritma Tesisi	Biogas	Auto Producer	1.659	12	12	
Gemciler Reg. Ve Hes (Boztepe Enerji Üret.)	Hydro	Private	7.98	35	20	
Gökgedik Hes (Uhud Enerji Üretim Tic.)	Hydro	Private	20.49	84	63	
Gökgedik Hes (Uhud Enerji Üretim Tic.)	Hydro	Private	3.776	16	12	
Göknur Gida Mad. En. İm. İt. İh. Tic. Ve San. Aş.	Imported Coal	Auto Producer	1.55	6	6	
Goodyear (İzmit/Köseköy)	Natural Gas	Auto Producer	5.2	39	39	
Güdül 2 Hes (Yaşam Enerji Elektrik Üretim)	Hydro	Private	4.88	20	15	
Güllübağ Baraji Ve Hes (Senenerji Enerji)	Hydro	Private	96	0	0	
Günaydin Res (Manres Elektrik Üretim A.Ş.)	Wind	Private	10	0	0	
Günder Reg. Ve Hes (Arik Enerji Üretim A.Ş.)	Hydro	Private	28.22	0	0	
Günder Reg. Ve Hes (Arik Enerji Üretim A.Ş.)	Hydro	Private	0	0	0	
Gürteks İplik Sanayi Ve Ticaret A.Ş.	Natural Gas	Auto Producer	6.698	53	53	
Hatipoğlu Plastik Yapi Elemanlari San.	Natural Gas	Auto Producer	2	14	14	
Horu Reg. Ve Hes (Maraş Enerji Yatirim Sn.)	Hydro	Private	4.24	17	12.5	
Horu Reg. Ve Hes (Maraş Enerji Yatirim Sn.)	Hydro	Private	4.24	17	12.5	
Horyan Hes (Horyan Enerji A.Ş.)	Hydro	Private	5.68	23	15	
İkizdere (Zorlu Doğal Elektrik Üretimi A.Ş.)	Hydro	ORT	18.6	110	100	
İnnores Elektrik Yuntdağ Rüzgar (Aliağa-İzmir)	Wind	Private	5	0	0	
İşbirliği Enerji Üretim San. Ve Tic. A.Ş.	Natural Gas	Private	19.46	146	146	
Itc Adana Enerji Üretim (Adana Biokütle Snt)	Solid Waste	Private	4.245	0	0	

Name Of Unit	Fuel	Ownership	Capacity (MW)	Project Production Potential (Gwh)	Firm Production Gwh	Date of Commissioning
Itc Bursa Enerji Üretim San. Ve Tic. A.Ş.	Solid Waste	Private	7	0	0	
Itc Bursa Enerji Üretim San. Ve Tic. A.Ş.	Solid Waste	Private	1.4	0	0	
Itc Bursa Enerji Üretim San. Ve Tic. A.Ş.	Solid Waste	Private	1.4	0	0	
İzaydaş (İzmit Çöp)(Köseköy)	Solid Waste	Private	0.33	2.22	2.22	
İzmir Büyük Efes Oteli Kojenerasyon Tes.	Natural Gas	Auto Producer	1.2	9	9	
Jti Torbali Kojenerasyon Santr. (Jti Tütün)	Natural Gas	Auto Producer	4	30	30	
Karadağ Res (Garet Enerji Üretim)	Wind	Private	10	0	0	
Kartalkaya Hes (Sir Enerji Üretim San.)	Hydro	Private	8.001	27	15	
Kayadüzü Res (Baktepe Enerji A.Ş.)	Wind	Private	7.5	0	0	
Kayadüzü Res (Baktepe Enerji A.Ş.)	Wind	Private	25	0	0	
Kayadüzü Res (Baktepe Enerji A.Ş.)	Wind	Private	6.5	0	0	
Kayaköprü 2 Hes (Arsan Enerji A.Ş.)	Hydro	Private	10.2	36	36	
Kayseri Kati Atik Deponi Sahasi (Her Enerji)	Solid Waste	Private	1.305	0	0	
Keskinoğlu Tavukçuluk Ve Damizlik İşlet.	Natural Gas	Auto Producer	6	45	45	
Kilavuzlu Hes (Elektrik Üretim A.Ş.)	Hydro	EUAS	40.5	150	100	
Kirikdağ Hes (Özenir Enerji Elektrik Üret.)	Hydro	Private	16.86	71	40	
Kivanç Tekstil San.Ve Tic.A.Ş.	Natural Gas	Auto Producer	2.145	12	12	
Kocaeli Çöp Biyogaz (Lfg) (Körfez Enerji)	Solid Waste	Private	1.2	0	0	
Kocaeli Çöp Biyogaz (Lfg) (Körfez Enerji)	Solid Waste	Private	1.063	0	0	
Köknar Hes (Aycan Enerji Üretim Tic.)	Hydro	Private	8.024	25	15	
Kozbeyli Res (Doğal Enerji Elektrik Üretim)	Wind	Private	20	0	0	
Kozdere Hes (Ado Madencilik Elektrik Ür.)	Hydro	Private	6.12	9.24	5.28	
Küçüker Tekstil San. Ve Tic. A.Ş.	Lignite	Auto Producer	5	40	40	
Kürce Reg. Ve Hes (Dedegöl Enerji)	Hydro	Private	12.046	48	36	
Kütahya Şeker Fabrikasi (İzole)	4.568		4.568			
Kütahya Şeker Fabrikasi (İzole)	4.568		4.568			
Kuzgun (Zorlu Doğal Elektrik Üretimi A.Ş.)	Hydro	ORT	20.9	36	0	
Menge Baraji Ve Hes (Enerjisa Enerji)	Hydro	Private	44.71	0	0	
Mercan (Zorlu Doğal Elektrik Üretimi A.Ş.)	Hydro	ORT	20.4	0	0	
Metristepe Res (Can Enerji	Wind	Private	27.5	0	0	

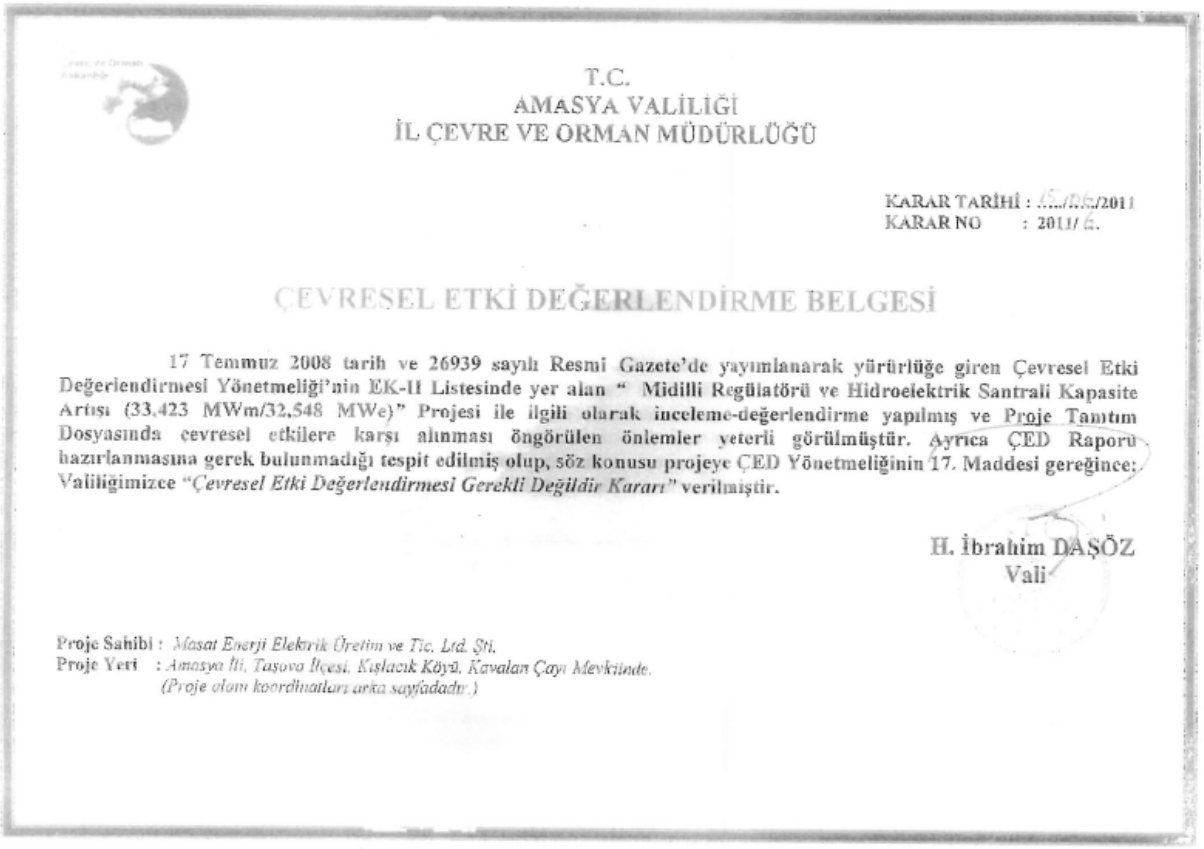
Name Of Unit	Fuel	Ownership	Capacity (MW)	Project Production Potential (Gwh)	Firm Production Gwh	Date of Commissioning
Entegre Elekt.)						
Metristepe Res (Can Enerji Entegre Elekt.)	Wind	Private	11.5	0	0	
Midilli Reg. Ve Hes (Masat Enerji Elektrik)	Hydro	Private	20.97	81	45	
Mosb Enerji Elektrik Üretim Ltd. Şti. (Dg.+M+F.O.)(Manisa)			12			
Murat I-Ii Reg. Ve Hes (Murat Hes Enerji El.)	Hydro	Private	35.628	0	0	
Muratli Reg. Ve Hes (Armahes Elektrik Ür.)	Hydro	Private	11	27	16	
Mursal I Hes (Peta Mühendislik Enerji)	Hydro	Private	4.18	17	13	
Mutlu Makarnacilik Sanayi Ve Ticaret A.Ş.)	Natural Gas	Auto Producer	2	16	16	
Naksan Enerji Elektrik Üretim A.Ş.	Natural Gas	Private	8	60	60	
Naksan Enerji Elektrik Üretim A.Ş.	Natural Gas	Private	8	60	60	
Niksar Hes (Niksar Enerji Üretim Ltd. Şti.)	Hydro	Private	20.08	0	0	
Niksar Hes (Niksar Enerji Üretim Ltd. Şti.)	Hydro	Private	20.08	0	0	
Odaş Doğalgaz Kçs (Odaş Elektrik Üretim)	Natural Gas	Private	54.96	415	415	
Odaş Doğalgaz Kçs (Odaş Elektrik Üretim)	Natural Gas	Private	18.32	135	135	
Ofim Enerji Santrali (Ostim Finans Ve İş Mer.)	Natural Gas	Private	2.05	16	16	
Ören Reg. Ve Hes (Çelikler Elektrik Üretim)	Hydro	Private	19.932	21.75	12	
Ortadoğu Enerji (Kömürcüoda) (Şile/İstanbul)	Solid Waste	Private	2.83	0	0	
Ortadoğu Enerji (Oda Yeri) (Eyüp/İstanbul)	Solid Waste	Private	4.092	0	0	
Özmaya Sanayi A.Ş.	Natural Gas	Auto Producer	5.354	40	40	
Pamukova Yen. En. Ve Elek. Ür. A.Ş.	Solid Waste	Private	1.4	0	0	
Pancar Elektrik Üretim A.Ş.	Natural Gas	Private	17.46	130	130	
Pancar Elektrik Üretim A.Ş.	Natural Gas	Private	17.46	130	130	
Papart Hes (Elite Elektrik Üretim)	Hydro	Private	22	87.98	66.4	
Papart Hes (Elite Elektrik Üretim)	Hydro	Private	4.6	0	0	
Pisa Tekstil Ve Boya Fabrikalari (İstanbul)	Natural Gas	Auto Producer	1.02	7	7	
Polat Hes (Elestaş Elektrik Üretim A.Ş.)	Hydro	Private	3.28	14	10	
Polat Hes (Elestaş Elektrik Üretim A.Ş.)	Hydro	Private	3.28	14	10	
Poyraz Res (Poyraz Enerji Elektrik Üretim)	Wind	Private	14	0	0	
Poyraz Res (Poyraz Enerji Elektrik Üretim)	Wind	Private	20	0	0	

Name Of Unit	Fuel	Ownership	Capacity (MW)	Project Production Potential (Gwh)	Firm Production Gwh	Date of Commissioning
Poyraz Res (Poyraz Enerji Elektrik Üretim)	Wind	Private	16	0	0	
Samsun Avdan Kati Atik (Samsun Avdan En.)	Solid Waste	Private	2.4	0	0	
Samurlu Res (Doğal Enerji Elektrik Üret.)	Wind	Private	12	0	0	
Samurlu Res (Doğal Enerji Elektrik Üret.)	Wind	Private	10	0	0	
Sancar Reg. Ve Hes (Melita Elektrik Üretim)	Hydro	Private	0.74	3	2	
Şanliurfa Osb (Rasa Enerji Üretim A.Ş.)	Natural Gas	Private	11.72	82	82	
Sarihidir Hes (Molu Enerji Üretim A.Ş.)	Hydro	Private	6	24	18	
Selçuk İplik San. Ve Tic. A.Ş.	Natural Gas	Auto Producer	8.6	65	65	
Selva Gida San. A.Ş.	Natural Gas	Auto Producer	1.712	14	14	
Şenköy Res (Eolos Rüzgar Enerjisi Üretim)	Wind	Private	26	0	0	
Seyrantepe Hes (Seyrantepe Elekt. Üret.)	Hydro	Private	56.84	207	161	
Sezer Bio Enerji (Kalemirler Enerji Elektr.)	Solid Waste	Private	0.5	4	4	
Şifrin Reg. Ve Hes (Bomonti Elk. Müh. Müş.)	Hydro	Private	6.744	18	10	
Sinem Jeotermal (Maren Maraş Elektrik)	Geothermal	Private	24	0	0	
Sirakonaklar Hes (2m Enerji Üretim A.Ş.)	Hydro	Private	18	0	0	
Soda Sanayi A.Ş. (Mersin)		252.2	252.2			
Söke-Çatalbük Res (Abk Enerji Elektrik)	Wind	Private	18	0	0	
Söke-Çatalbük Res (Abk Enerji Elektrik)	Wind	Private	12	0	0	
Soma Res (Soma Enerji Elektrik Üretim A.Ş.)	Wind	Private	24	0	0	
Suluköy Hes (Du Elektrik Üretim A.Ş.)	Hydro	Private	6.924	0	0	
Tekirdağ-Çorlu Koj. San. (Ode Yalitim San.)	Natural Gas	Auto Producer	2.035	15	15	
Teleme Reg. Ve Hes (Tayen Elektrik Üret.)	Hydro	Private	1.57	11	6	
Telli I-Ii Hes (Falanj Enerji Elektrik Üret.)	Hydro	Private	8.72	32	18	
Tercan (Zorlu Doğal Elektrik Üretimi A.Ş.)	Hydro	ORT	15	51	28	
Trakya Yenişehir Cam San. A.Ş.	Biogas	Auto Producer	6	45	45	
Tuğra Reg. Ve Hes (Vira Elektrik Üretim A.Ş.)	Hydro	Private	4.9	18	10	29/12/12
Tuna Hes (Nisan Elektromekanik Enerji)	Hydro	Private	37.19	92	52	
Tuzköy Hes (Baten Enerji Üretimi A.Ş.)	Hydro	Private	8.44	0	0	
Tuzlaköy-Serge Reg. Ve Hes (Tuyat Elekt.)	Hydro	Private	7.14	0	0	

Name Of Unit	Fuel	Ownership	Capacity (MW)	Project Production Potential (Gwh)	Firm Production Gwh	Date of Commissioning
Üçkaya Hes (Şirikçioğlu Elektrik Üretim A.Ş.)	Hydro	Private	1.04	10	6	
Umut I Reg. Ve Hes (Nisan Elektromekanik)	Hydro	Private	5.8	21	12	
Vizara Reg. Ve Hes (Öztürk Elekt. Üret. Ltd.)	Hydro	Private	8.578	0	0	
Yağmur Reg. Ve Hes (Bt Bordo Elk. Ür.)	Hydro	Private	8.946	0	0	
Yamanli Iii Kaps. Gökkaya Hes (Mem Enerji)	Hydro	Private	28.54	0	0	
Yamanli Iii Kaps. Himmetli Hes (Mem Enerji)	Hydro	Private	26.98	0	0	
Yavuz Hes (Arem Enerji Üretim A.Ş.)	Hydro	Private	5.8	0	0	
Yedisu Hes (Özaltin Enerji Üretim Ve İnşaat)	Hydro	Private	15.14	48	27	
Yedisu Hes (Özaltin Enerji Üretim Ve İnşaat)	Hydro	Private	7.57	24	14	
Yeni Uşak Enerji Elektrik Santrali	Natural Gas	Private	8.73	64	64	
Yeni Uşak Enerji Elektrik Santrali	Natural Gas	Private	1	7	7	
Yildirim Hes (Bayburt Enerji Üretim Ve Tic.)	Hydro	Private	7.118	26	15	
Yildirim Hes (Bayburt Enerji Üretim Ve Tic.)	Hydro	Private	3.559	13	7	
Yokuşlu Kalkandere Hes (Sanko Enerji)	Hydro	Private	5.2	0	0	30/12/12
Yongapan (Kastamonu Entegre)(D.İskelesi)	Natural Gas	Auto Producer	15.04	112	112	
Zeytin Bendi Hes (Zeytin Enerji Üret. San.)	Hydro	Private	5.2	18	10	
Zeytin Bendi Hes (Zeytin Enerji Üret. San.)	Hydro	Private	0	0	0	
Zorlu Enerji (B.Karıştıran)	Natural Gas	Private	25.7	193	193	

ANNEX-3: THE EIA EXEMPTION CERTIFICATE OF THE PROJECT ACTIVITY

Please note that the project owner have changed tittle, but the government authorities didn't change the certification as indicated in the following correspondence in the host country official language (Turkish).



T.C.
AMASYA VALİLİĞİ
İL ÇEVRE VE ORMAN MÜDÜRLÜĞÜ

KARAR TARİHİ : [illegible]/2011
KARAR NO : 2011/ [illegible].

ÇEVRESEL ETKİ DEĞERLENDİRME BELGESİ

17 Temmuz 2008 tarih ve 26939 sayılı Resmi Gazete'de yayımlanarak yürürlüğe giren Çevresel Etki Değerlendirmesi Yönetmeliği'nin EK-II Listesinde yer alan " Midilli Regülatörü ve Hidroelektrik Santrali Kapasite Artışı (33,423 MWm/32,548 MWe)" Projesi ile ilgili olarak inceleme-değerlendirme yapılmış ve Proje Tanıtım Dosyasında çevresel etkilere karşı alınması öngörülen önlemler yeterli görülmüştür. Ayrıca ÇED Raporu hazırlanmasına gerek bulunmadığı tespit edilmiş olup, söz konusu projeye ÇED Yönetmeliğinin 17. Maddesi gereğince; Valiliğimizce *"Çevresel Etki Değerlendirmesi Gerekli Değildir Kararı"* verilmiştir.

H. İbrahim DAŞÖZ
Vali

Proje Sahibi : *Masat Enerji Elektrik Üretim ve Tic. Ltd. Şti.*
Proje Yeri : *Amasya İli, Taşova İlçesi, Kışlacık Köyü, Kavalan Çayı Mevkiinde.*
(Proje alanı koordinatları arka sayfadadır.)

ANNEX-4: THE ELECTRICITY GENERATION LICENSE

T.C.
ENERJİ PİYASASI DÜZENLEME KURUMU

EPDK

ÜRETİM LİSANSI

Bu Lisans kapsamındaki üretim tesisi Yenilenebilir Enerji Kaynağı kullanmaktadır.

Lisans No : EÜ/996-4/751

Tarih : 07/12/2006

Bu Lisans, **Masat Enerji Elektrik Üretim ve Ticaret Limited Şirketi**'ne, Amasya İli'nde kurulacak olan **Midilli Hidroelektrik Santralı** üretim tesisinde 07/12/2006 tarihinden itibaren 49 yıl süreyle, üretim faaliyeti göstermek üzere 4628 sayılı Elektrik Piyasası Kanunu ve ilgili mevzuat uyarınca Enerji Piyasası Düzenleme Kurulu'nun 07/12/2006 tarihli ve 996-4 sayılı Kararı ile verilmiştir.

Yusuf GÜNAY
Başkan

Bu lisans, genel ve özel hükümleri ile ayrılmaz bir bütündür.

ANNEX-5: THE MAP SHOWING THE RESERVOIR AREA OF THE PROJECT ACTIVITY

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